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DETROIT

NATIONAL PETROLEUM NEWS

NEW Refining Technology EDITION

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DECEMBER 1, 1937

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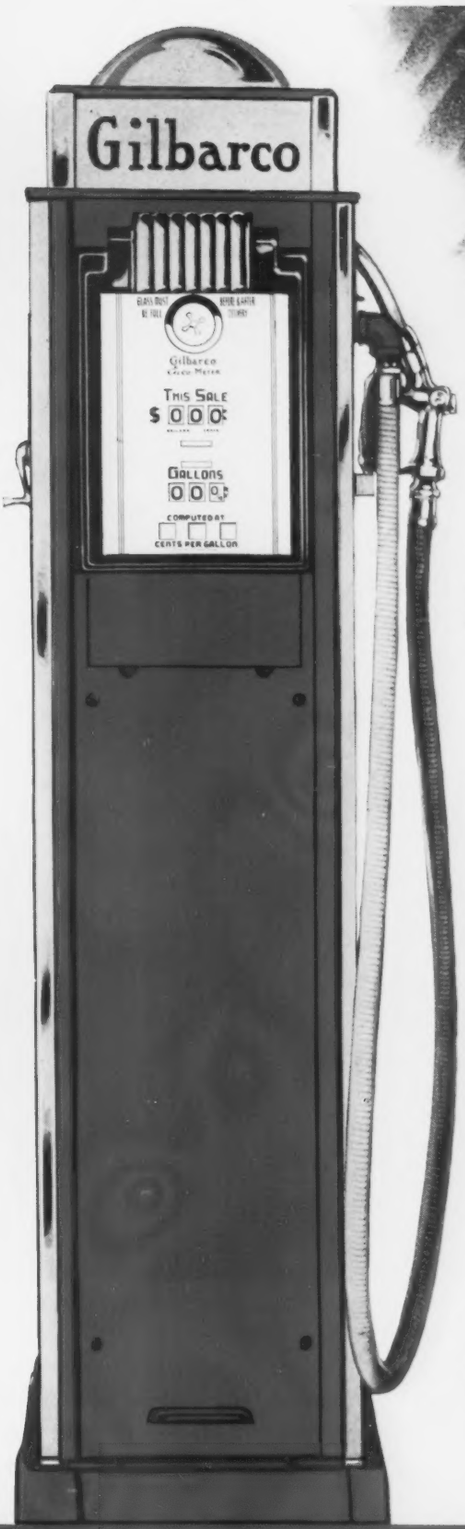

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H. W. Boggess

A profession and hobby of safety work has earned for H. W. Boggess, superintendent of safety, Sinclair Prairie Oil Co., Tulsa, the chairmanship of the Petroleum Section of the National Safety Council. He was elected to this post during the annual meeting of the Safety Council in Kansas City in October.

Mr. Boggess has been in charge of Sinclair's safety work since its inception 12 years ago. He is now president of the Tulsa Safety Council, and the Oklahoma State Safety Council. He organized the Citizen's Traffic Board of Tulsa. Each year he lectures on accident prevention work at Tulsa University, Oklahoma U., and Oklahoma A. & M. College.

WS

LAST MINUTE
OIL NEWS SECTION

News By Teletype From 4 News Bureaus

National Petroleum News

News From Oil Industry Everywhere

VOLUME 29 WEDNESDAY, DECEMBER 1, 1937 NUMBER 48

Governors Wired By Marland For Oil Price Confab

By Teletype
N. P. N. News Bureau

TULSA, Nov. 29.—Climaxing his recent utterances on crude oil prices, Governor Ernest W. Marland, of Oklahoma, yesterday telegraphed governors of 21 states suggesting a conference at which the stabilization of crude oil prices would be discussed.

The governor's action followed a statement by Col. Ernest O. Thompson, of the Railroad Commission of Texas, chairman of the Interstate Oil Compact Commission, that prices would not be discussed in the January meeting of the commission if he can prevent it. Col. Thompson took the position that Texas has asserted at all compact meetings that the compact charter expressly forbids price fixing attempts and that the commission is limited to a discussion of methods of preventing physical waste of oil and gas.

Governor Marland started the price discussion in newspaper statements during the recent American Petroleum Institute convention in Chicago. He then said he had heard there was considerable talk at the Chicago meeting of possible reductions in crude oil prices. He threatened an increase in the Oklahoma gross production tax if such cuts were made, saying he would initiate a petition for submission to the voters to amend the present tax law, which imposes a tax of five per cent.

Madison Trial

On Nov. 26 he warmed up the subject again, this time to say that, while oil executives were afraid to get together and discuss prices because of the fact "there might be another trial like the one at Madison," the federal government could not prevent governors from discussing the subject.

In the long telegram sent to governors of all producing states including Utah, a negligible producer, and Iowa, producing no oil, Marland said the cur-

(*Continued on page 24*)

To Build Tanker

MANITOWOC, Wis., Nov. 29.—Contract for the construction of a 300-foot diesel powered lake tanker costing about $750,000 has been let to the Manitowoc Ship Building Co. here by the Socony-Vacuum Oil Co., Inc. Announcement of construction plans was made by Bryan S. Reid, general manager of Socony's Chicago division.

It is expected that the new tanker will be completed by the spring of 1938. It will be of all-steel construction, electrically welded. It will have a beam of 49 and one-half feet; depth of 20 and one-half feet, and will have a capacity for nearly 1,200,000 gallons.

The tanker will be of twin-screw propulsion, powered by two 750 horsepower diesel engines. It will serve the company's terminals between its refinery at East Chicago, Ind., and Buffalo, N. Y.

Lawyers Battle 2 Days Over Relevancy of NRA

By Teletype

By A. M. PETTY, Chief of Washington News Bureau

MADISON, Nov. 30.—Federal Judge Stone late today ruled that defendants in the oil conspiracy case here could offer evidence that their case was within the Appalachian Coals decision of the U. S. Supreme Court, which permitted evidence of "reasonableness" of activities alleged to be violations of the anti-trust laws.

Judge Stone's decision came after hours of argument over admissibility of the so-called NRA defense. (The oil companies have contended their activities were not only legal, but done in compliance with the NRA oil code.) Judge Stone said the court would pass on each offer of evidence as it came in.

Government counsel wanted to shut out entirely, under a blanket ruling by the court, all evidence involving the oil code unless defense counsel could show documentary proof that defendants' activities were formally approved under the NIRA. They also sought to bar any evidence touching "reasonableness" of defendants' activities.

On the specific question which led to the prolonged argument, however, the court sustained the government's objection. Chief of Defense Counsel Donovan had asked Wirt Franklin, Ardmore, Okla., first defense witness, about a threat by independent refiners in the fall of 1934 to cut the price of crude and Interior Secretary Ickes' plea staving off the price cut.

Judge Stone contended that inasmuch as the price of crude remained at $1 from Sept., 1933 into 1936, he doubted whether it had any effect on gasoline prices. However, Judge Stone did say that the defense would be permitted to put in evidence as to any factors in the price of gasoline during 1935 and 1936.

Franklin, on the stand the morning of Nov. 29, gave the court and jury much "background" information on the producing branch of the industry.

During the afternoon session

Study Of Oil Change Needs Started By Automobile Clubs

N. P. N. News Bureau

WASHINGTON, Nov. 29.—An inquiry to determine how often motor oil should be changed is being launched by the American Automobile Assn.

The association's contest board has begun mapping plans for the study, requested in a resolution adopted at the A.A.A.'s recent New York convention, designed to "clear up as far as possible the confusion that exists regarding this subject," according to Thomas P. Henry of Detroit, president of the auto club association.

"Our clubs directed us to make this inquiry," Henry said. "Because of the lack of agreement, it was felt that the time had come for the A.A.A., representing the oil consumers, to make a study of the problem and present the best available information to the motoring public."

The first step in the inquiry, it was indicated, will be the collection and study of all available literature on the subject of oil change practice, including trade, technical and scientific material, and, the A.A.A. said, "the obtaining of all viewpoints regarding proper practices."

In announcing the study, Henry said the motorist's interest in economical and efficient oil change practice may be measured in terms of the $400,000,000 annually which he pays out for lubricating oil, and added:

"In carrying out the inquiry, we shall, of course, proceed on an impartial, unbiased basis, at all times keeping paramount the interest of our one and only client—the American motorist."

Joint Gasoline Plant

TULSA, Nov. 29. — A community natural gasoline plant is to be built in the Billings field, in Oklahoma, by the Continental Oil Co., Shell Petroleum Corp., Phillips Petroleum Co., and Tide Water Associated Oil Co. The Continental company will operate the plant. The plans call for processing approximately 10,000,000 cubic feet of gas daily, with a gasoline production of 20,000 gallons daily.

Defense Calls First Witness to Stand

November 29, there were many arguments in front of the jury over admissibility of evidence.

Today, Judge Stone excused the jury before the first hour of the morning session was concluded as arguments developed over again over Franklin's testimony. During the absence of the jury, Government Attorney Lewin and Col. Donovan clashed in the most heated exchange of the trial so far.

Withholds Ruling

Reconvening on Monday, Nov. 29, after the Thanksgiving recess, Judge Stone announced that he was "still pondering" the motions to dismiss the indictment as to certain individuals and that he needed more time to consider it.

Defense Counsel Thomas then filed exceptions to the court's adverse ruling on the motions made by defense counsel to strike out certain evidence.

Prior to calling the first defense witness, there was a whispered conference at the bench which, however, was taken down by the court reporters. The transcript revealed that Charles I. Francis, Pure Oil attorney, announced that "the government having rested its case, the defendants C. B. Watson and Henry Dawes rest their case also", subject to the court's action on their dismissal motions.

Counsel for other defendants, according to the transcript, reserved the right, in case of denial of their dismissal motions, to rest their cases as of the close of the government's case.

First Defense Witness

Chief Defense Counsel Donovan then proceeded to start presentation of the defense for the 16 corporate defendants and 41 individual defendants still remaining in the case.

First witness called by the defense was Wirt Franklin, independent producer of Ardmore, Okla., who was first chairman of the Planning and Co-ordination Committee under the NIRA oil code.

Guided by Donovan's questioning, Franklin told about his start in the oil business 25 years ago when he bought from an Indian a farm "because it looked like good corn land like I had known in Illinois" and found that "tar" in the water, complained about by the Indian, was crude oil.

Franklin told how, under an arrangement with J. M. Critchelow, from Titusville, Pa., a well was drilled which turned out to be the discovery well of Healdton field — the first well in southern Oklahoma. He also told about his experiences in Oklahoma City field and a score of others in which he operated.

Government counsel did not object until Donovan's line of questioning brought Franklin up to time of the oil code.

P. and C. Committee

"Now, tell us what you were doing in particular, beginning about September, 1933," Donovan said.

"I was a member of the oil code authority — the Planning and Co-ordination Committee from September, 1933," Franklin replied.

Government Attorney Crawford let that go by, but he objected when Donovan asked what this commitee was, contending that the question was "incompetent, irrelevant and immaterial."

Judge Stone overruled the objection and Franklin went on to describe appointment of the committee by President Roosevelt and explain that its duties were to "plan" and "co-ordinate" activities of the industry, make recommendations to the Federal oil administration and co-operate with the oil bodies of producing states.

Conservation Defined

Franklin defined conservation as not "the hoarding of oil in the ground" but production without "waste", including economic waste.

Donovan then led the witness through a detailed description of crude oil and its production. Government Attorney Chaffetz objected when the questioning reached the cost of drilling a well. He contended that nothing up to that point in Franklin's testimony "had any bearing on the real issue of the case."

"I think it is a background that we ought to know something about," replied Judge Stone in overruling Chaffetz.

Franklin said that drilling costs varied, reaching $250,000 and more for the deeper wells; some of which extend down for over two miles, he added.

For the last hour or so of the Nov. 29 morning session, Franklin explained geological structures favorable to the trapping of oil and how it is discovered and produced.

Working Well Model

The entire courtroom, including the judge, jury and government counsel, followed Franklin interestedly as he used a large-scale model of a cross-section showing various strata and oil sands. Then, with a working model of a producing well, with a miniature pump driven by an electric motor and lighted by tiny flood lights, the witness explained how oil is brought to the surface.

Opening the afternoon session, Franklin continued his explanation of crude production, touching also on gas and natural gasoline.

When Franklin started to tell about "stripper wells" and their importance as representing 40 per cent of the country's reserves, Chaffetz objected. Donovan then returned to the question and answer routine.

Franklin testified that nowadays only one out of 20 wildcat wells turns out to be a producer. He said that the ratio was one out of 60 before the development of scientific methods of discovering possible oil-bearing structures. Pointing out that non-producers are sometimes brought in right in the middle of a proven area, he said that one out of every three wells drilled is a dry hole.

Drawn-Out Argument

A clash between counsel developed when Chaffetz objected to Donovan's question about "what happens to a stripper well operator when the price gets lower than his cost of production?"

"The answer is obvious — he loses money," Chaffetz said. "But it is dragging a red herring across the case."

Judge Stone permitted Franklin to answer that it would mean abandonment of the well.

But the real argument broke out a moment later when Donovan asked Franklin to tell the

(*Continued on page* 19)

"Just A Bungle"

(From Editor and Publisher, the journal of the newspaper profession, Nov. 27, 1937)

"Complete collapse of the government's case against Warren C. Platt, publisher of oil trade journals, was anticipated by all who understood the nature of the charges. It was patently absurd to accuse a publisher of conspiracy to fix prices of a commodity, simply because his papers had regularly published information which his readers accepted as authoritative, and which, it was readily proved, was gathered and published as routine matter.

"There was no evidence of conspiracy, no evidence that the publisher had violated any law, in letter or spirit. Nevertheless, the publisher had to go to great legal expense in preparing a defense and had to take many weeks from his business at a time when circumstances demanded his presence. The vindication is welcome. It should not have been necessary.

"How are newspapers to obtain the news of price changes except from the markets where goods are bought and sold? How is a publisher to know, or even suspect, that the trade is using his information for unrevealed purposes? How can he prevent such use, even if he knows it?

"Can daily newspapers be held responsible for the fact that gamblers cook up games around such innocent figures as reports of treasury balances, or even the temperatures in the weather report? Is the knowledge that such games are played sufficient reason for failing to publish financial and weather statistics? If the publisher does know that his news is used by law violators, does that knowledge make him an accomplice?

"If Mr. Platt had wilfully connived with the fixers of oil prices and juggled his published figures to suit their needs, there would have been no question of his conspiracy. If a daily newspaper publisher and a set of gamblers arrange for the daily publication of news for the purpose of catching sucker pennies, there is a plain violation of several laws.

"But where a publisher, as Mr. Platt did, printed useful information for the service of all, with no part in any price-fixing or its proceeds, it is hard to see how an indictment against him and his papers could have been considered, much less returned and brought to trial. It is unfortunate that there is no provision for redress in such cases. If there were, the smart amateurs of the Department of Justice might have less nervous trigger fingers."

Roosevelt Urges Cut In Federal Highway Funds

By Teletype
N. P. N. News Bureau

WASHINGTON, Nov. 30. — President Roosevelt today urged a sharp reduction in federal highway aid as a budget balancing measure.

The President's special message to Congress on the subject recommended three distinct points to be covered in legislation he hopes to see enacted.

1. Cancellation of the $238,000,000 already authorized for highways in the fiscal year 1939 (beginning next July 1), but not yet apportioned to the states.

2. Limitation of public roads authorizations for the fiscal year 1940 "and for each of the next few succeeding years" to $125,000,000 per year.

3. Elimination of the provision in federal aid laws which requires the Secretary of Agriculture to apportion road funds to the states after authorization but before such funds are actually appropriated.

The President's message came only a few days after the annual report of the Bureau of Public Roads was made public, asserting that public funds now available were "insufficient" to meet highway improvements and extension needs occasioned by heavier and speedier automobile travel.

States' Problem Heavy

"The state highway departments, confronted with increased responsibilities out of all proportion to the revenues available to them, and pressed with continued arguments to provide improvements in all directions, face difficult problems," the report said.

Under the federal-aid laws, the states must match federal funds for road construction.

The President's message pointed out that Congress had authorized $238,000,000 each for the current fiscal year and for 1939, but that $200,000,000 of the 1938 (current year) authorization had not been appropriated, although some of it is already obligated to the states.

The President said he intended to include in the budget estimate for 1939 an appropriation of approximately $100,000,000 to cover a part of these obligations, "with the balance to be provided for 1940."

This would leave unobligated and unappropriated the $238,000,000 authorized for 1939, the President pointed out, recommending the authorization be cancelled "in view of the large amounts which have been contributed by the federal government, particularly during the past five years, for the construction of public roads, and because of the necessity for taking definite steps to reduce expenditures for the purpose of securing a balanced budget."

Must Be Cancelled

If not cancelled, the agriculture secretary is required by law to apportion most of it to the states by Jan. 1, 1938.

It is this requirement that the President seeks to have eliminated from federal aid laws. This apportionment, he says, constitutes a contractual obligation on the part of the governor, regardless of appropriations for payment of the sums apportioned to the states.

"This mandatory provision completely ties the hands of the executives as to the amount of road funds to be included in the budget for any fiscal year. While I do not object to the apportionment among the states of such amounts as may be authorized for appropriation, I do most strenuously object to the mandatory incurrence of obligations by the federal government under such apportionments without regard to its ability to finance them from its revenues," the President said.

Meanwhile, Senator Lonergan, Connecticut, has proposed a system of "self-liquidating" tourist highways following direct lines between important points throughout the country. His plan has been submitted to the roads bureau. The senator contends these projects would aid employment and promote safety. They would be separated from bus and truck lanes and would be free from railroad crossings.

The general plan is to have the federal government issue tourist highway bonds, using the funds to build lighted boulevards. The cost would be liquidated, he explains, by a mileage charge of from one-half to one cent from motorists preferring to use them.

These would not be tolls, he says, since the motorists may take the other main highways already existing, if they prefer.

Buys Meter Concern

MILWAUKEE, Nov. 29.—It is announced by W. C. Heath, president, that the A. O. Smith Corp. has purchased the Smith Meter Co., of Los Angeles, manufacturers of rotary truck, loading rack and refinery meters. Reorganization of manufacturing and sales departments is now in progress to increase production to enable this new concern to meet demands from the petroleum industry.

IN THE NEXT ISSUE OF N.P.N.

Putting Itself on the Map

• The use of large newspaper advertising space and by other means "doing things in a big way" is not altogether reserved for major oil companies. Out in Denver, an independent company used a special 8-page newspaper section to announce the opening of its new refinery and the marketing in this area of its own brand of gasoline. A jobber grown to an integrated company in 12 years. The story in the Dec. 8th issue of NATIONAL PETROLEUM NEWS.

Uniforms Make the Station Man

• Or the nearest N.P.N. ever came to a style show. More and more the various advantages of uniforms for those who are in contact with the buying public are being appreciated, and not the least for station salesmen. There's not only serviceability but also considerable style appeal in the uniforms offered today. Illustrated and the subject broadly discussed in a special article, Dec. 8th, based on a survey among oil companies.

If You Would Sell Gift Items—

• Don't miss another article by Sam A. Weissenburger, merchandising expert, on the possibilities for service stations sharing the coming Holiday trade. The trade secrets that open pocketbooks at Christmas time told out of the experiences of many years in department store Holiday selling. A fitting addition, in the Dec. 8th issue, to earlier articles NATIONAL PETROLEUM NEWS has carried on this subject.

Oil State Sets Jan. 3 Deadline On 44-Hour Law

HARRISBURG, Nov. 30. — Pennsylvania employers will have until Jan. 3 to conform to the state's new 44-hour law, Ralph M. Bashore, chairman of the state industrial board, said today.

While the regulations of the measure become law Dec. 1, employers have been advised by the department of labor and industry they have until Jan. 3 to adjust their schedules to its provisions.

Meanwhile, the industrial board, a unit of the department of labor and industry, has not yet considered the requests of the Pennsylvania oil refining industry for exceptions to the law.

Hearings were held in Harrisburg before the industrial board after the state announced any exceptions would be granted on an industry wide, rather than a plant basis. Principal points at issue as enumerated by the Pennsylvania refiners at the hearings were:

The law provides no person shall work more than five hours without a one-half hour lay-off period, with certain exceptions to plants operated by 6-hour shifts.

Refiners said that operations are such as to require constant attention, but it was very easy for operators to "munch a sandwich with one hand and occasionally twist a valve with the other." Neither would it be practical they said, to hire a full-time relief operator.

The law provides for a maximum work period of eight hours in any one day and a work week of five and one-half days. Under emergency conditions, it is sometimes necessary to work longer to restore normal operations, the refiners pointed out.

While the board has not yet decided on the refiners' exceptions, Bashore said, the board has ruled that employers hiring three persons or less may work them 54 hours a week, nine hours in any one day and six days a week.

Compensation

Effective Jan. 1, the oil industry will be affected by amendments to the state workmen's compensation and occupation disease act. These amendments will raise the minimum compensation to $12 per week from $7 when an employe is unavoidably absent from work by virtue of injury or other cause attributable to occupational hazard. The maximum remains at $18 per week.

U. S. May Dictate Truck Size And Weight Standard

N. P. N. News Bureau

WASHINGTON, Nov. 29.—First step toward establishing federal size and weight limits for trucks has been taken by Interstate Commerce Commission, with the issuance of an order calling for an ICC investigation into the question.

The logical result which may be expected from setting up of such regulations is elimination of the complex set-up of contradictory state size and weight laws which have hampered interstate trucking virtually since its inception.

Large quantities of petroleum and its products are carried in interstate commerce by tank trucks, which have had to conform with as many sets of regulations in their trips as the number of states through which they passed.

A three-judge federal court in South Carolina early this year outlawed that state's truck weight law, which set up a maximum weight of 20,000 pounds, as a barrier to flow of interstate commerce, although the court did not rule on the Contention of truckers that the federal Motor Carrier Act superseded all such state regulatory laws.

At that time, however, ICC had not taken any action toward establishing federal size and weight limits, as authorized under the Motor Carrier Act and as covered by this order.

Include Private Carriers

The current investigation will go into the question of necessity for setting up of regulations "governing the size and weight of motor vehicles used by . . . common, contract and private carriers in the transportation of property in interstate or foreign commerce," to quote the order.

This was taken to indicate that the commission contemplates making the regulations, if established, applicable to company-owned tank trucks transporting company-owned petroleum products, as well as to common and contract carriers, so long as they operate across state lines.

No date has been set for a hearing or other action under the order.

Va. Tax Collections

RICHMOND, Va. — Virginia collected $1,484,019.88 in October in taxes on 29,680,397 gallons of gasoline, according to the state revenue bureau.

Rates Up $5.28 A CAR

N. P. N. News Bureau

TULSA, Nov. 15.—High points of the freight rate increase on interstate shipments of petroleum and its products, as applying particularly to the Mid-Continent refining district and the middle western marketing territory, are:

(1) No increase on shipments *wholly within* the south and southeast.

(2) Increase applies on shipments from the southwest *into* the south and southeast.

(3) No increases on "truck compelled" rates:

(a) Up to 150 miles in Louisiana.

(b) Ranging from 150 miles up to 250 miles elsewhere, depending on point of origin.

(4) Increase amounts to 0.066 cent a gallon, or $5.28 on an 8000-gallon tank car of light oils; and 0.074 cent a gallon, or $5.92 on an 8000-gallon tank car of heavy oils.

Railroads Keep Traffic Despite Rate Boost, Traffic Men Report

N. P. N. News Bureau

TULSA, Nov. 29.—The one cent per 100 pounds increase in rail freight rates on petroleum and its products which became effective Nov. 15 will not stimulate truck transportation of petroleum products from Mid-Continent refineries, according to a majority of traffic men in that area.

In the first place, the railroads elected to make no changes in their truck compelled rate schedules. Thus, on short hauls, where the rail rates have been readjusted to meet truck competition, no increase in freight rates was made.

While, by and large, rates on short hauls are truck compelled and on long hauls the rails have a natural advantage, there is no exact length of haul that divides the two. In some refining areas the railroads have evidently experienced serious truck competition only up to 180 miles, and have increased rates on hauls beyond this distance. In other areas, the railroads have increased rates only after 250 miles.

State Lines a Factor

Just as no increase was made in the interstate truck compelled rates, the intrastate rates in some of the southwestern refining areas also have not been changed. While Missouri granted intrastate rate increases, no hearings have been held by the regulatory bodies in Oklahoma, Kansas, Texas, Arkansas and Louisiana.

The fact that the truck compelled rates on oils are not increased, makes the intrastate rates within the Mid-Continent area of comparatively small importance to the railroads.

Further, truck transportation will not be stimulated, according to the traffic men, because the one cent per 100 pounds increase amounts to only $5.28 on a tank car of light oil, and $5.92 on a tank car of heavy oil. The increase would not apply on rail shipments under 150 miles due to the truck compelled rates, and transport truck operators in many instances have indicated that after 150 miles have been reached the economy of transport trucking begin to shrink at a rapid rate. A 2000-gallon transport truck, for example, would have to make four trips to earn the $5.28 increase in rail rates on a tank car of light oil and would have to travel well over 150 miles each trip.

The Interstate Commerce Commission did not grant any increase in rates on interstate shipments made wholly within the south and southeast. The rails moving oil into the south and southeast from the areas west of the Mississippi and north of the Ohio river, however, have added the one cent increase to their tariffs. This increase, however, is not expected to cause any change in the present marketing picture in that area.

Buys E. Texas Acreage

PHILADELPHIA, Nov. 24.—A 75 per cent interest in the East Texas oil properties of the Petroleum Corp. of Venezuela has been purchased by the Atlantic Refining Co., it announced today.

The properties contain 210 acres, on which are 36 producing oil wells. The purchase will add about 500 net barrels daily to Atlantic's East Texas production, the company stated.

Fears Dominance Of Trucking By U. S. Railroads

N. P. N. News Bureau

WASHINGTON, Nov. 29. — This country is on the way to a transportation monopoly dominated by the railroads that will be injurious to both private and common carriers.

The next two years will find a congestion of anti-truck legislation such as has never been known before.

These were the storm warnings hung out by Judson C. Welliver, Philadelphia, of the Sun Oil Co., in an address before the American Trucking Assns., Inc., at its recent annual convention in Louisville.

Welliver pointed out that the railroads destroy every form of communication with which they come into contact, and that today "the railroads are out to establish control of the highway system".

He said that the common carriers have been fighting for their rights for years, but that the private carriers are not immune.

"Let the time come when the contract and common carrier is driven off the highway and given under railroad control and the next campaign will be against the private carriers, and when that happens we will have donated to the railroads the magnificent highway system of the country," Welliver said. "The trucking industry alone in registration fees and gas taxes, leaving out of consideration the regular taxes, are now paying about 170 per cent of all taxes that all the railroads of the U. S. pay. Railroad taxes last year were about $238,000,000. The special taxes paid by the commercial highway people amounted to about 170 per cent of that amount.

"The argument that we get is that highway transporters get free use of the highways and the railroads have to pay for their own highway. One-third of the railroads are in receivership and the others would be if it were not for the loans from the U. S. Treasury. Do any of you know of any loans made to highway carriers?", Welliver asked.

Speaking of impending legislation, Welliver said that there would be "fights" in every state legislature and that the legislation enacted will be equally injurious to both private and common carriers.

For this reason, he pointed out, the various divisions of the highway transportation industry should be brought together to protect mutual interests.

Detroit Police Order Down 'Gas' Discount Signs

DETROIT, Nov. 29.—Detroit police have been playing a new kind of oil game throughout this city during the past week, a game new to both the police and the oil industry. Known as "Discount Signs Are Falling Down", the game is simple to play, and apparently quite effective.

Early last week an unofficial survey reported there were approximately 230 signs hanging at stations throughout the Detroit area on which was advertised gasoline at discount prices. Today, the county prosecutor's office estimates that about 90 per cent of these signs have been removed, following pointed hints from police officers.

This sign-pulling-down campaign is a part of a drive which Duncan C. McCrea, Wayne county prosecutor, is waging in behalf of Michigan's new fair trade practice law, which prohibits selling below cost and giving away discounts.

Police Given Orders

During Thanksgiving week McCrea instructed all police precincts to see that all gasoline discount signs were removed. Station operators who objected to the procedure were to be charged with violation of the state fair trade law and presented with warrants. According to Paul Mayrand, assistant prosecutor in charge of enforcing the fair trade law, offending dealers were practically all willing to abide by the request of the visiting police officers.

As an added effort in his drive to enforce this law, McCrea last week called a meeting of the police chiefs of all the municipalities in the county, explained the law to them, and asked their cooperation in seeing that the law was enforced.

Practically all of the 21 individuals and 15 corporations named in warrants issued Nov. 20 have been arraigned and examination dates have been set for Dec. 14 and 21, with the alleged offenders released on bond. Warrants were issued, on McCrea's recommendations, charging violation of the law on counts of selling below cost, offering unearned discounts, or both.

Following are the individuals, and their companies, who have been arraigned, according to the county prosecutor's office:

Carl Langer, of the Langer Auto Supply Co.; J. A. Citrin, Nathan Kolb, Jack Katz, of the Citrin-Kolb Oil Products Service Station; Charles and William Gershenson, of Ned's Auto Supply Co.; Marvin Goldberg, of Marvin's Super Service; James C. Bright, of James J. Bright & Sons Co.; Bernard Sucher, of Sucher's Super Service; Louis and Edward Gorman, Dave Rubenstein, of Gorman-Rubbens Auto Supply; Stanley and Marvin Grossman, of the Michigan Automotive Salvage Co.; A. Gordon Lewin, of the Log Cabin Service Station; Henry Stark Hickey, of Stark Hickey, Inc.; Arthur Schoenrock, of the Shamrock Service Station; and Tancred W. Quinn, of the Firestone Auto Supply and Service Stores.

The only individual who has not yet surrendered is Roy R. Fisher, of the Argo Oil Co. According to Mayrand, he is expected to surrender Nov. 29 or 30.

Warrants issued against Charles E. Austin and his company, the Sunny Service Oil Co., have been held in abeyance pending further investigation by the prosecutor's office, Mayrand said.

Wis. Oil Jobbers In 6.6 Complaint

N. P. N. News Bureau

WASHINGTON, Nov. 29. — Another complaint against the estimated weight of 6.6 pounds per gallon used by railroads in computing freight charges on petroleum and its products has been added to the growing number now before the Interstate Commerce Commission.

Latest case was filed by the Wisconsin Petroleum Assn., and several hundred of its members, who asserted that the estimated weight is "substantially in excess of actual weight" of such products shipped, and that as a result of this they have been paying transportation charges on property not actually transported. Nearly all railroads hauling petroleum products between all refinery points and points in Wisconsin are named defendants in the complaint.

The Wisconsin oil men ask that the ICC establish a new and reasonable basis for computing these charges, and that they be awarded reparations for alleged overcharges in the past.

ICC has not indicated when it plans to hold hearings on the several 6.6. complaints before it.

Surplus Profits Tax Change May Be Retroactive

N. P. N. News Bureau

WASHINGTON, Nov. 29. — Although almost a dozen bills to either repeal or modify the undistributed corporate surplus tax have been introduced since the special session of Congress began two weeks ago, it appears likely that no action will be taken on any tax readjustment until after the regular session begins next month.

President Roosevelt has indicated that he is ready for the proposed revision of the tax any time Congress is, but the Ways and Means Committee finds itself confronted with problems created by the need for additional revenue to finance the agricultural relief bill, and to replace losses that would be occasioned by the revision of both the undistributed profits and capital gains taxes. Thus it is probable that the regular session will be started before any sort of revision bill is reported to the floor from that committee.

Meanwhile, a Senatorial bloc whose members include Senators George of Georgia, McCarran and Pitman, of Nevada, Bulkley of Ohio, King of Utah, Clark of Missouri, and others, is said to be preparing to insist that any relief from the tax be made retroactive so as to apply to 1937 corporate incomes.

Among the bills introduced concerning the tax are those providing outright repeal, authored by Representatives Bacon, New York; Snell, New York; Harter, Ohio; and Jenkins, Ohio; those providing for modification by Representative Wene and Senator Smathers, both of New Jersey, and that of Representative Wilcox, Florida, which would grant exemption up to 50 per cent if the money is used for new construction.

Authorize Embargoes

New bills affecting the oil industry introduced in the past week include that of Representative Lewis, Maryland, to grant the President authority to embargo shipments of certain commodities — including oil — to Japan, a large oil customer; and that of Representative Ford, California, which, like the bill introduced in the Senate last week by Senator McAdoo, California, would exempt intercoastal trade from Panama Canal tolls.

At present intercoastal petroleum shipments pay about 15 per cent of total tolls collected at the Canal, which in 1936 amounted to about $23,500,000.

Lewis' bill was referred to the Foreign Affairs Committee, and Ford's to the Merchant Marine and Fisheries Committee.

B. C. King Dies

TULSA, Nov. 29.—B. C. King, 65, attorney and one of the pioneers in development of the Fitts pool, Oklahoma, died Nov. 21 in Ada, Okla. In partnership with W. A. Delaney, Jr. and Sam Miller, he owned a substantial part of the Fitts field at the start of its development. A considerable part of their holdings were sold to the Carter Oil Co.

17th Convention Of Neb. Jobbers

LINCOLN, Neb., Nov. 29.—Nebraska oil marketers will gather in Omaha next week for their seventeenth convention to discuss oil marketing problems.

Nebraska Petroleum Marketers, Inc., meeting in the Fontenelle hotel Dec. 7, 8, and 9, will be a mixture of addresses and business sessions, with seven program addresses and three business meetings.

Speakers on the opening afternoon program will be Cullen T. Wright, called the "Will Rogers of Nebraska," on the customer's viewpoint of the oil industry; Gov. Roy L. Cochran; and Carl Barker, chairman of the Missouri Petroleum Industries Committee, St. Louis.

The first business session will follow the first day's speaking program.

Business Talks

Four addresses are on the second day's program. An Ethyl Gasoline Corp. speaker will talk on motor fuels. Walter Kinderman will talk on salesmanship. Wm. H. Price, Nebraska auditor of public accounts, will talk on the new county auditing and budgeting bills. Ralph R. Mathews, Battenfeld Grease & Oil Corp., will talk on lubricants.

The second business meeting will follow this speaking program. The annual banquet and dance will be the second evening.

The final business session will be held the third day.

Three officers and two directors are to be elected this year, and the association office has mailed nominating ballots to members in preparation of a slate to be voted on during the convention.

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Before a Million Dollars Of Injustice May Be Done

By WARREN C. PLATT, Editor

U. S. Attorney General Cummings is asking for $1,000,000 for his anti-trust work, almost three times the amount of previous appropriations.

Business is in a serious depression, with the upturn not in sight.

Would it not be wise for Congress to exercise its legal right and fulfill its moral and political obligation to the country, therefore, by inquiring of Cummings and the President just what policy they plan to pursue as to the spending of this million dollars?

What kind of anti-trust suits are going to be brought? Who, or what class of business, is going to be sued?

Just how is the need and justice of such suits going to be determined, and by whom in the Department of Justice or elsewhere in the government?

Congress and even the more fanatical administration supporters are disturbed at the unfavorable trend of business. Congress especially is openly of the opinion the depression is at least partly due to the fear that has been engendered in business by various acts of the administration.

Could there be a more potent disturber of business confidence than fear and uncertainty as to the fairness and justness with which the President and his Attorney General will spend this million dollars, especially in view of the President's recent utterances against "trusts"?

It has always been the duty, as well as the practice, of Congress and its appropriate committees to study requests from government departments for the necessary funds for their maintenance and expansion. To a greater or less extent these requests have been scrutinized, even at times down to rather fine detail. Therefore it would only be in the line of duty for the proper committees of Congress to go into considerable detail, at this time, in studying the attorney general's request for a million dollars and then to go farther and examine the personnel and methods of operation of the anti-trust division and even the entire Department of Justice itself. Most businesses, in these unfortunate days, are doing just that again, so it is asking nothing unreasonable of Congress to apply the same close scrutiny to this important department of government.

Congress and the whole country are opposed to monopolies and trusts that violate the law. However, a study of the government's record, especially in this administration, may raise some doubt in the mind of a fair minded observer as to just what Cummings and Roosevelt might have in mind when they spend this million dollars.

What Kind of Suits?

Cummings says he can carry on ten good sized anti-trust suits with this million dollars. Without the use of good judgment and a fair and honorable consideration of all facts, ten suits could be so directed at industry as to be entirely unwarranted and to push this country much further into this depression. Certainly this administration has not shown the calm, judicial moderation in considering its attacks on the alleged evils of business that inspires confidence.

Just what kind of anti-trust suits, therefore, has the Attorney General in mind?

Is he going to attack "concentrations of great wealth" of which many in the administration have often talked, in other words just attack "bigness" more from its economic character than because of any legal misdoing?

Is he going to have his young men, many newly come to government service from radical environments, continue to poke around among the acts of the tens of thousands of business men under the late codes, seeking possible technical violations of the Sherman law?

Is Cummings going to have those new fledged legal sharks seek a slip-up under a code where a lay code operator forgot about some legal rule?

Is he going to have his bright young men single out some act under a code, and then bring the alleged offenders into court without reference to the code or without letting them even introduce their code and the surrounding circumstances in explanation of their seeming illegal act?

Is Cummings going to sue every one who offends the laws, regardless of their political affiliations, regardless of whether they have "co-operated" with the "New Deal" or not?

These are not idle questions, because they point directly to what the government did to oil men and their companies in the pending oil anti-trust suit at Madison, Wis. The government has completed presenting its case there and all it concerns is what took place during the code, in the presence of government and code authorities and all duly published to the entire oil industry.

Yet Cummings' young men have fought bitterly, but futilely, to keep from judge and jury all reference to the code and to President Roosevelt and what he asked of the oil industry that prompted these acts.

Already these representatives of Cummings have admitted they had no case against certain corporations and one individual, and the judge has already dismissed others with more motions of dismissal under consideration.

Still having this oil case at Madison in mind, Congress could also inquire into the details of the operation of the Department of Justice, study its methods and practices and look over its personnel.

If, perchance, the higher-ups at Washington do deprecate using an act under the oil code as an excuse for bringing this Madison case, as reports have said, then how did it happen that the case was brought?

Who in the Department of Justice passed on the preliminary field reports and ordered a grand jury investigation?

Who passed on the testimony produced before the grand

jury, read the draft of the indictments and said "go ahead"?

What did that person think of all the "leading questions" asked grand jury witnesses and did not that person hear even the faintest reports about "rough work" in the grand jury room, the bullying and browbeating tactics that would shame a police "third degree"?

Does the department approve of the conduct of its representatives in the trial of the case?

Is the department at Washington proud of the way its representatives have hid out evidence during the trial?

These are questions that Congress could well seek truthful answers to while considering the attorney general's request for a million dollars for his "anti-trust" work.

To indict on a criminal charge, the penalty for which is a heavy fine and a year's sentence to the penitentiary, some three score outstanding business men in an important industry is a serious matter. Who in the administration weighed that before the indictment was brought?

Instead of three score leading business men it might be some poor devil who has neither funds nor ability to make his protests articulate at any time. How many of those have suffered from the power of the United States as wielded by a single individual, perhaps, in the Department of Justice?

Safeguard Citizens' Rights

Common sense would seem to indicate that the exercise of this great governmental power should be hedged around with every precautionary provision possible, to insure that the innocent would not have to suffer needlessly. It would seem that within the department, there should be a set-up, akin to a court of law, before which the prosecuting attorneys would present and argue their supposed cases. Yet, according to the published interview of the former head of the anti-trust division, all matters pertaining to the Madison case were finally decided by him alone.

Then, as to the individuals in the Department of Justice, Congress quite properly could investigate their character and capabilities?

Are they suited by temperament and training to use such great power of government?

Are they mentally and morally qualified for the work?

Have they the reputation for truth telling and honor and personal integrity that men should have who can, by their personal decisions, put citizens of the country in jeopardy and subject them to disgrace and tremendous expense?

Interesting, if not flattering, answers to all these questions can be found in a study of the Madison oil case.

And now a personal plea by one of those needlessly and wrongfully injured at Madison. I have been subjected to great loss of time from my business when it could least afford it. I have been put to great expense. I have been tried as a criminal. I have been acquitted, although the department's representatives tried to dismiss me in a left handed way which the judge did not let them get away with.

For all of this I get no recompense from the government, nor from the individuals whose faulty, or worse, judgment injured me. No not even an "I am sorry." Were they acting as private citizens I could make them pay roundly; but as private citizens they would not have such power. They got their power and protection solely by being employed by the government, by being employed by the same department that now asks Congress for a million dollars for more so-called anti-trust suits.

In view of the written and sworn record made before a fair and honorable judge, who sought diligently for the facts, I urge that Congress give due thought to safeguarding the rights of American citizens before giving the present Department of Justice another million dollars for any more of its alleged "anti-trust" suits.

Wire Tapping Harder To Cure Than Drink Habit, Says Botts

(A letter to the Editor from Ellick Botts, Consulting Pumper, of Grayhorse, Okla.)

To the Editor:

I thought I would die laughing the other day when I read about the indignation in official Washington concerning the wire tapping that has been discovered. You may remember that a device was found, according to the newspapers, in an office next door to Secretary Ickes' private lair and the natural inference was that somebody was getting a listen to what the secretary had to say in his off the record moments.

The thing that tickled me was that there wasn't a bit of concern shown back in 1933 et seq. when a horde of mail order diploma dicks descended on the people of Texas and elsewhere under the chapronage of Mr. Louis R. Glavis and, by the way, whatever became of him?

Well, they had high old times then, snooping and prowling and carrying on like a bunch of adolescents on a Hallowe'en alley raid.

The only people who were spared the nocturnal scrutiny of the guerilla raiders were the "hot oilers" themselves.

Well, there was no official concern in Washington at all about such doings. Your present writer remembers well that after one such piece of writing in which the assertion was made that some of the Glavis dicks were spending part of their time getting thrown into the local jugs for revels and outbursts unworthy of the representatives of a great republic, Mr. Ickes' only comment was that such antics proved they were human.

Most of the boys who put on the East Texas privy-tipping have gone elsewhere, chiefly to the obscurity from which they came, and their sleuthing has nearly been forgotten. There were some delicious episodes. While browsing through some old files the other day we came across the memoirs of a couple of field hands who had been held three or four days without warrant by some of the Glavis folks. They were captured near Shreveport and grilled severely out in the piney woods. One of the dicks posed as a judge out to get a preview of the evidence, a preliminary he indulged in before sentencing the boys, according to their affidavits.

This sort of thing, however, was getting a little outside the well-worn path. Mainly the investigations had to do with each other. There was a new local head man every little while and the result was several cliques, each out to get the dirt on the others. So they devoted their evenings to getting tangled up in the lilac bushes in each others' backyards while wearing headsets and waiting for some villany to be discussed over the telephone and the pace grew so dizzy that every now and then some sleuth was surprised when he came to transcribe his notes to find he was setting down a record of his own conversation of the previous evening.

I understand that research has developed a method of tapping wires much superior to the old portable outfits which required the operator to tote along a pair of those long spurs so that he could, if necessary, shin up a pole and make his tap. The assemblage carried by the East Texas juveniles was an awkward mess of stuff and there was always the danger that the tapper would get snarled up in his wires and drop his headset, thus frightening the object of his attentions into hanging up the phone.

The modern way, I hear, is to make the connection right at the telephone of the party under surveillance — a word much employed in the reports of the East Texas operatives. A man comes to the house or office and claims he works for the telephone company and has been sent over to replace a cord or a telephone; so the one he puts in is all geared up to make a party line out of the victim's connection and there is even a little gadget concealed in the base of the telephone which sets a dictograph to work taking down whatever the suspect is imprudent enough to talk about.

I read in the papers that the unofficial apologist for the administration says in his daily column that there was no wire-tapping at all and that the whole thing was based upon a misunderstanding. But habit is difficult to break and I'll bet that there really was a hook-up to the Ickes telephone, probably put there by somebody who had tapped all other phones in the department and just wanted to complete his circuit.

Yours truly,

Ellick Botts, Consulting Pumper and Experienced Party-line Listener.

Suit Will Test All 3 California Fair Trade Laws

N. P. N. News Bureau

LOS ANGELES, Nov. 29.—The Retail Petroleum Dealers Assn. late last week filed request for a temporary injunction restraining Irwin D. Roscoe of Los Angeles, service station proprietor, from alleged violation of three California laws governing retail marketing.

The Retail Petroleum Dealers Assn., through its counsel, J. Hart Dasteel, requested the injunction for the duration of Roscoe's trial. Roscoe is defendant before the Los Angeles Superior (municipal) Court in a suit brought by the dealers' association charging Roscoe on three counts. They are as follows:

1. Violation of the California Fair Trade act. R. P. D. A. alleged in its suit that Roscoe sold Super Shell gasoline at his station at a lower price than was stipulated in the supplier's contracts. Under the act the supplier may stipulate the resale price of his branded product.

2. Violation of the California Unfair Practice act. The dealer's association charged Roscoe with selling to favored customers at prices below his retail posted price of 18 cents per gallon, while other customers paid the full 18 cents.

3. Violation of the California Oil Substitution act. Price discrimination is likewise held a violation of this act.

Elmer A. Hayes of Los Angeles, operator of another Shell station in the same neighborhood as Roscoe's, is joint plaintiff with the R. P. D. A. and asks for damages as may be determined by the court.

Will Fight Suit

Roscoe, it is said, signed a stipulation to refrain from under-canopy price cutting for one year, but later announced he would fight the suit.

After this announcement, Plaintiff Counsel Dasteel applied for the temporary injunction. Roscoe has been asked by the Los Angeles Superior Court to show cause why the injunction should not be issued.

Decision Expected In Elk Hills Case

N. P. N. News Bureau

LOS ANGELES, Nov. 29.—Federal Judge Leon Yankwich is expected to hand down his decision within a short time on the ownership of the now famous Section 36 of the Elk Hills oil field in the San Joaquin Valley.

The government brought suit in Judge Yankwich's court at Fresno, against the Standard Oil Co. of California and others in an effort to regain title to the oil lands.

Final arguments were concluded Nov. 12th and the court took the matter under advisement, indicating a decision would be announced in Los Angeles within several weeks. Observers predicted a finding in favor of the government but thought final settlement would not be reached this side of the U. S. Supreme Court.

The presiding court at the last hearings is expected to decide whether evidence presented in previous litigation over title to the Elk Hills land was sufficient to sustain a decision by Secretary of the Interior Ickes in 1935 that the disputed land had known mineral content in 1903 and that title to such minerals had therefore never passed from the government.

Defendants at the last session included Standard Oil Co. of California, Standard Gasoline Co., Pan American Petroleum Co., Mrs. Edward L. Doheny and executors of the Doheny estate, Tide Water Associated Oil Co., Chase National Bank of New York, Bank of America, and several individuals having interest in the disputed land.

Standard is, by far, the owner of most acreage on Section 36 and has carried the brunt of court action concerning the question of ownership. Heading the company's legal representation at the Fresno hearing was Donald R. Richberg, former NRA general counsel, who contended that the Department of the Interior's 1935 ruling should be reversed.

Should the court uphold this ruling, it will determine the amount of damages due the government from oil explorations. Judge Yankwich has already held that the operating company is entitled, upon showing the land was acquired in good faith, to expenditures for exploration in excess of $7,000,000.

Defense attorneys, who in addition to Richberg included E. M. Prince and H. Burgess of San Francisco, and Oscar Lawler of Los Angeles, based their argument for title on the claim that the land was not known to have mineral content in 1903 when title was passed to the state from the government.

Permission was given by government counsel, John W. Preston, of San Francisco, for the defense to introduce land office records in support of their claim to validity of title.

Gasoline Plant Men Will Review 1937

N. P. N. News Bureau

LOS ANGELES, Nov. 27.—Special emphasis will be laid on recent construction projects, when the California Natural Gasoline Ass'n. meets in Los Angeles Dec. 9 for its final session of the year.

"1937 on Parade" has been announced as the theme for a program which will include discussion of noteworthy developments of the natural gas industry in California the past year.

W. W. Robinson, The Texas Co., will be chairman of the meeting. New plants built in California the past year will be discussed by four men who were intimately associated with the work, who will tell of the innovations and modern practices incorporated in the construction of these units.

C. L. Parkhill will discuss Belridge Plant No. 4, at North Belridge. M. E. Garrison will summarize construction and operating details of the General Petroleum Co.'s absorption plant at Wilmington; Frank West, The Texas Co.'s gasoline plant at South Mountain; and F. W. Wilson, Rancho Gasoline Corp.'s plant at Grapevine.

J. C. Burks, O. E. Field Gasoline Corp. and president of the association, will preside at the dinner meeting.

Oil Scientists Honor 70th Birthday Of Pioneer In Catalysis

N. P. N. News Bureau

CHICAGO, Nov. 29. — The foremost authority on catalysis in America, if not in the entire world, Dr. V. N. Ipatieff celebrated his 70th birthday anniversary as honor guest of the Chicago Section of the American Chemical Society at a banquet Nov. 26.

Signalizing 37 years of research in this field, Ipatieff showed how catalysis is revolutionizing chemical science. The "Philosopher's Stone" has been discovered indeed, and it proves to be a catalyst, making possible the consummation of reactions formerly impossible to complete, and reducing other reaction times from months to minutes, he pointed out.

With Dr. J. C. Morrell, chairman of the Chicago section, presiding, many of the most famous chemists of America met at the banquet to do honor to this world-known authority from Russia, who has chosen to complete his life span in America. Introduced to the assemblage by Hiram J. Halle, head of Universal Oil Products Co., Ipatieff sketched for the chemists the "Chemical Tree" of his life of research in catalysis, which began at or just before the turn of the century.

His first experience with catalytic action was the discovery that iron is a catalyst to promote the dehydrogenation of amyl alcohol, a work which was published in March, 1901 in the Berichte der Deutschen Chemischen Gesellschaft, immediately before the publication of Sabatier and Senderens' work on hydrogenation of benzene, in Comptus Rendus.

From that time to the present Ipatieff has given his attention to increasing the knowledge of catalysis and its application to chemical research. In this country his best-known work is the development of catalytic polymerization of petroleum still gases, a process in commercial operation in a large number of refineries here and abroad. The extension of catalysis to high temperature and pressure conditions was retarded until a suitable autoclave could be developed and the results showed the profound effect of increasing these two factors on the progress of chemical reactions.

Ipatieff also discovered the advantages of certain substances when added to the catalysts used for a given purpose—aids which are called promoters, but which might be called "catalysts of catalysts". Ipatieff showed how his work began in 1900, and was built on experiences when producing butadiene from alcohol, and on dehydrogenation and dehydration experiments in the first three years of this century.

He urged that textbooks and teaching methods in chemistry be cleared of now obsolete processes and methods, and that modern chemical teaching be based on the newer discoveries especially in the fields where catalysis has revised old reactions to give an entirely new chemistry.

"There is no need to crowd the textbooks, especially in organic chemistry," Ipatieff said, "with reactions which no one ever uses at the present time and which are absolutely unessential."

Winter Is Now Peak Market For Oil, Fuel Oil Sales Offset Gasoline Loss

By M. G. VAN VOORHIS

N. P. N. News Bureau

CLEVELAND, Nov. 29.—The coming winter season will again be a bigger selling season for petroleum products than the preceding summer season. It should be considerably larger than last winter and the 1936 summer season. That the year 1936 was no small year for the oil industry may be judged by the fact that 1929 gasoline consumption was only three fourths as large.

This optimistic view of the coming months is supported by several facts found in month by month petroleum consumption figures compiled by the U. S. Bureau of Mines.

First, the demand for all oils has been greater during the winter season than the preceding summer season for the past two years. The difference is relatively small, 0.4 per cent last winter and 1.7 per cent two years ago but comparison with the years since 1928 shows a trend toward raising the total winter consumption of all oils to the summer level.

The drop in demand for all oils during the winter of 1928-29 was 4.7 per cent, representing nearly 18,000,000 barrels of petroleum products. The winter following the summer of 1933 experienced a drop of 3.1 per cent in demand for all oils. Furthermore, the drop in motor fuel consumption was only 17.1 per cent last winter, as compared with 25.2 per cent the winter of 1928-29.

Several Products Gain

Chief factor in boosting winter demand is gain in consumption of kerosine, gas oil, distillate fuel oil and residual fuel oil. A year ago consumption of these oils during the five months from November to March was 55,614,000 barrels more than during the five months from May to September, 1936. Consumption of motor fuel was 38,131,000 barrels less. The winter season was the gainer by 17,500,000 barrels, roughly, in volume.

The present year of 1937 continues an upward trend in consumption of motor fuel and of all oils that started in 1934.* Motor fuel consumption during the first nine months of 1937 was 9.3 per cent larger than during a similar period in 1936. Consumption gain for the 12 months ended Oct. 1, 1937, over the preceding 12 months was 9.5 per cent. The figures for the 12 months ended Oct. 1, 1937, are 514,841,000 barrels as compared with 469,255,000 barrels in the preceding 12 months.

Increasing Gains

Similar gains are shown for all oils. For the first nine months of 1937 demand for all oils was 8.6 per cent greater than the same period in 1936. This compares with annual gains of 11.2 per cent for 1936, 6.9 per cent for 1935, 6.0 per cent for 1934, and 4.0 per cent for 1933. Consumption gain for all oils for the 12 months ending Oct. 1, 1937, was 9.1 per cent over the preceding 12 months. Demand totaled 1,093,163,000 barrels in 1936. During the first nine months of 1937 demand reached 869,896,000 barrels, as compared to 801,052,000 barrels in the same period of 1936.

These figures show that the upward trend is evident to as recent a date as figures are available. Records for the month of September, recently issued, show it to be the biggest month for domestic consumption of all oils ever recorded. There have been only four months in the history of the industry that demand has topped 100,000,000 barrels. Three of them were last summer and one, significantly, was December, 1936. September's total was 103,496,000 barrels.

Exports of refined products rose from 70,000,000 barrels in 1933 to nearly 80,000,000 barrels in 1936. Nearly 79,000,000 barrels of refined products had been exported in the first nine months of this year, a gain of 34 per cent over the same period of 1936.

Total deliveries of fuel oil and gas oil to foreign and domestic markets went above 1929 volume for the first time in 1936 with an estimated volume of 440,000,000 to 450,000,000 barrels, as compared to 411,150,000 barrels in 1929, and a low of 321,564,000 barrels in 1932. This market, however, reflects more closely general industrial activity.

Heating Oil Leads

One portion of this market has made rapid strides in the past eight years, never falling below 1929 volume. This is heating oil, now grown to be the leading product in terms of sales. Sales volume in 1936 was 99,249,000 barrels, which is greater than the sales to railroads, gas and electric power plants, the manufacturing industries, or for bunker fuel in their best years. It represents a 29 per cent increase over 1935. Little more than a third of this volume went for this purpose in 1929. There is no sign of let-up in 1937.

Demand for gas oil and fuel oil increased 10.3 per cent during the first nine months of 1937, as compared with a similar period in 1936. Kerosine demand increased 7.5 per cent, due to its use as range oil. Demand for range oil has been multiplied by eight or nine since 1929. Total volume of kerosine demand, however, is only a tenth of fuel oil and gas oil demand.

Further indication of expansion in heating oil volume is continued large volume sales of oil burners. Orders for distillate oil burners for the first nine months of 1937 totaled 301,539, as compared with 225,654 during a similar period in 1936 and a corresponding figure of 121,193 in 1935. These are used in ranges, stoves, water heaters, and space heaters.

More Burners Installed

Oil burners consuming fuel oil of Commercial Standard No. 1 or heavier, used in central heating plants for homes and buildings and for industrial purposes also enjoyed a substantial increase. Orders in the first nine months of 1937 totaled 151,681, as compared with 137,694 during a similar period in 1936 and with 98,045 in 1935.

Sales of gas oil and fuel oil to the other major consumers—railroads, power plants, manufacturing industries, merchant marine, and others—in 1937 will probably come back, in total, to 1929 volume or above.

Still gas is another product which has shown substantial increase since 1931. Consumption for the first nine months of 1937 was 13.7 per cent over the same period in 1936. Total demand in 1936 was 54,441,000 barrels.

Asphalt and road oil sales show stimulation, particularly in 1936 and this year. Consumption in 1936 was 22,185,000 barrels of asphalt and 7,689,000 barrels of road oils which, all told, was 38.2 per cent above 1935 figures. This volume was 26.5 per cent greater than 1930 and over 20 per cent greater than in 1929, the last high year. During the first nine months of 1937 both asphalt and road oil demand increased in volume about 8.5 per cent over 1936 volume.

The petroleum industry produces each year more than 76,000 pounds of greases for use in lubricating farm machinery.

*See front cover NATIONAL PETROLEUM NEWS, Nov. 17, 1937.

Yearly Trend of Heating Oil Sales

(Thousands of Barrels)

Year	Motor Fuel	Kerosine	Range Oil	Gas Oil Fuel Oil	Heating Oil	Lubricants	Asphalt	Road Oil	All Oils
1929	375,999	36,032	Not compiled	Not	35,333	23,609	19,169	Not compiled	940,083
1930	394,800	34,736	3,000 (est.)	Avail-	43,279	21,589	18,194	5,425	926,450
1931	403,418	31,296	4,549	able	40,578	20,068	14,729	5,078	903,206
1932	373,900	33,221	6,841	308,157	44,264	16,614	12,652	6,648	835,482
1933	377,003	38,493	9,849	316,344	50,140	17,152	11,808	5,266	868,488
1934	410,339	44,234	15,756	340,371	60,822	18,484	13,924	6,378	920,164
1935	434,810	47,645	21,526	366,723	76,853	19,661	15,652	5,962	983,686
1936	481,591	51,479	27,292	408,991	99,249	22,676	22,185	7,689	1,093,163
1936 (9 months)	358,026	35,216	.....	294,463	.....	17,006	16,911	6,501	801,052
1937 (9 months)	391,276	37,841	.....	324,660	.....	17,876	18,345	7,044	869,896
Gain	9.3%	7.5%	.....	10.3%	.....	5.1%	8.5%	8.4%	8.6%

*Bureau of Mines, Petroleum Economics Division.

Cal. Oil Firms Join in Workers' Safety Program

N. P. N. News Bureau

LOS ANGELES, Nov. 27.—Industry-wide safety education of California oil workers is the purpose of a California Petroleum Safety Board, formed by a group of representative oil operators here the past week.

Designed as a co-operative venture, the program culminates several months of investigation and research into accident frequency among oil workers in this area and a study of the effect of unsafe working conditions on basic insurance rates.

The plan was originally sponsored by the Oil Producers Agency of California in an effort to reduce accidents among employes of its independent producer membership, and incidentally, to effect reductions in workmen's compensation insurance paid by these operators.

However, provision has now been made for expansion of the board to include representatives of the entire industry as soon as the movement is fully organized for the independent operators.

To organize and carry out the program A. J. Martinson has been appointed safety director, and has been granted an extended leave of absence from his duties with Union Oil Co. of California to direct the safety campaign.

His experience in oil industry safety work dates from 1928, when he joined Union Oil as a first aid instructor. Since then he has been safety supervisor of the company's sales and service station departments, chief safety supervisor in charge of this work and in the operating and sales departments, and, at the time of his selection to head the new safety program, he was supervisor of industrial training. Prior to joining Union Oil Co., Martinson had eight years' experience in safety work with U. S. Bureau of Mines.

Frank Travers, South Basin Oil Co., will head up the California Petroleum Safety Board as president; Melville Dozier, Jr., Texas Holding Co., is executive secretary; A. B. Jenks, Fullerton Oil Co., and L. L. Aubert, Bankline Oil Co., vice presidents; Paul Stanley, Barnsdall Oil Co., secretary; R. W. Metcalf, Signal Oil and Gas Co., treasurer; and C. E. Taber, Seaboard Oil Corp., assistant secretary-treasurer.

Primary objective of the new program—first of its kind in the California oil industry—will be to establish safer working conditions in drilling and production operations. The first corrective measures will be taken in the field because experience has shown operations there are more hazardous than other branches of the business.

According to Dozier, executive secretary of the board, "1936" witnessed more than 10,000 accidents in the petroleum industry of the U. S. By a definite safety program, designed and carried out by a safety-minded and determined central board, accidents can be reduced, suffering prevented, employes' earning power maintained and general working conditions for oil industry employes greatly improved.

"The oil industry, in initiating this movement, hopes and expects to improve employe working conditions, as far as it is humanly possible to do so."

Lack of safety education in the California oil industry was stressed by the Oil Producers Agency's safety committee, which found that out of 100 companies answering the committee's questionnaire, only five had safety engineers and not all of these were full-time employes.

The payroll represented by one group of companies without any safety engineering of their own was in excess of $10,000,000 a year. The committee found that several companies were using a type of safety education, such as posters, either supplied by insurance carriers or by other miscellaneous sources, but, with one or two outstanding exceptions, it found very little in the way of active safety education.

At a meeting in Los Angeles, several weeks ago, to discuss the program, A. A. Morey, Mid-Continent safety engineer, outlined some of the benefits to be gained by an industry-wide safety movement. In his talk he said:

"I know very well that, if concerted action on safety is inaugurated and maintained among California independents, gratifying results will be obtained. A similar plan of safety education was outlined and became effective in the Mid-Continent in 1928. Since that time the smaller independents have made some very startling accident records.

Credits Achieved

"Oil company after oil company throughout the Mid-Continent, who, in the so-called old days, were operating under very high debits or penalties applied to the regular manual or basic rates for workmen's compensation insurance, are now enjoying credits of 20, 30, 40, 50 and in one instance as high as 86 per cent.

"In addition, many of the manual or basic compensation insurance rates of states in the Mid-Continent for oil classifications have been reduced. The California manual should and can be reduced."

Illustrating the opportunity to make a financial saving through a safety program, Morey pointed out that one company in the Mid-Continent had such a bad accident record that it could hardly obtain workmen's compensation insurance, even at exceedingly high rates. Only a few years after inaugurating a safety program, this company won the national safety award, he said.

On one group of independent companies in the Mid-Continent, he said insurance premiums would have been about $2,000,000. However, safety education resulted in a 30 per cent reduction in rates to give a saving of $600,000. Using the four-to-one ratio-hidden costs equal four times as much as compensation, medical, and so on the hidden costs saving amounted to $2,400,000 for this group of companies, he said.

In analyzing accidents conditions on the west coast the Oil Producers Agency's safety committee found many instances in which comparable savings in compensation insurance could be made by means of an active and directed safety program.

At the same time, the importance of this program in promoting better working conditions and in strengthening employer-employe relations, is to be stressed.

Renews Efforts to Rid Stations of Gunmen

N. P. N. News Bureau

CLEVELAND, Nov. 30.—Efforts to stop robbery and burglary at service stations in the Cleveland area were renewed by George W. Shaw of Cleveland, president of the Franklin Oil & Gas Co.

Shaw on Oct. 2 sent letters to a number of oil companies, labor unions, and the Cleveland Assn. of Petroleum Retailers asking support of a program that included raising a fund to hire a detective full-time on service stations and an attorney "to see the prosecutor and every judge when one of these bandits is on trial to make sure that he gets his just punishment."

New Ill. Basin Fields Producing 16,000 Bbls. Day

N. P. N. News Bureau

TULSA, Nov. 30.—The three new pools in the Illinois Basin, in Illinois, discoveries of 1937, had produced 1,368,115 barrels to Nov. 1 and had averaged, for the preceding week, 15,992 barrels daily from 85 producing wells.

Recent predictions by Theron Wasson, chief geologist of the Pure Oil Co., chief producer in the new fields, that decline rates from initial flow to the pumping stage would be rapid, are borne out by figures which contrast production for the weeks ended Sept. 13 and Nov. 1. Numerous leases are shown to have been producing far less on the latter date, although the number of wells had increased.

The Clay City pool, Clay county, to Nov. 1 had produced a total of 1,079,338 barrels of crude. For the week ended Nov. 1 it had 63 wells, with a daily average production of 8248 barrels; for the week ended Sept. 13 there were 26 wells in the pool, with an average daily production of 12,059 barrels.

The Noble pool, Richland county, to Nov. 1 had produced 270,724 barrels. On Nov. 1 it had 19 wells with a daily average production of 7623 barrels; for week ended Sept. 13 there were 6 producing wells with 2172 barrels daily average production. The Cisne pool, Wayne county, to Nov. 1 had produced 18,053 barrels. It had three wells, with 121 barrels daily average production.

The other active spot in the state, the Patoka pool, Marion county, discovered early this year, is not in the Basin area and its production is from a shallow sand. Patoka to Nov. 1 has produced 209,558 barrels, of which the Adams Oil & Gas Co., discoverer of the pool, had produced 181,261 barrels. On that date the field was averaging 2362 barrels from 74 wells, of which the Adams company had 46 wells producing 1686 barrels.

In Vigo county, Indiana, near the Illinois line, Carter Oil Co. has pioneered in what is known as the Prairie Creek district. It has two wells producing from a Devonian formation. Its L. Paddock, in 16-10n-10w, Nov. 1 was making 37 barrels daily and its well on the Drake farm, 15-10n-10w was making 34 barrels. Total production of the two up to Nov. 1 had been 4474 barrels.

Either Legal or not Legal, Government Counsel Argues

(*Continued from page* 10)

jury about a study the Ardmore producer made of the relationship between the price of crude and conservation.

Chaffetz contended that the question of whether conservation laws are inadequate or whether the price of crude ought to be higher so that every "stripper well" in the country can operate is something for the states and Congress to decide.

No Connection

"It hasn't anything to do with the question in this case of whether the defendants got together and operated buying pools in defiance of the law," the government lawyer insisted.

Donovan said it was important to show that the defendants did not operate in defiance of the law. He contended that defendants should be permitted to show all the facts and circumstances surrounding their activities to the end that it was "in conformity with the law."

Chaffetz came back to say that if the defense was to be based on the code, then it must be shown that the defendants were operating under the code.

The government attorney declared that the only issue was — did the defendants combine to fix the price of gasoline? Any testimony about stripper wells, the price of crude oil and similar facts is the so-called rule of reason argument and is inadmissible under the Trenton Potteries decision, he added.

Donovan contended that the prosecution was seeking to build "a little chute, down which we must slide." He said that government counsel had a "mistaken theory that this is a price-fixing case."

Trenton Potteries Again

In the Trenton Potteries case, it was only after all the evidence on whether or not there was any price-fixing was allowed to come in that the court made its ruling, the defense counsel pointed out.

"What we are asking," Donovan continued, "is to be permitted to go ahead with our proof and show those facts and circumstances from which the jury would be permitted to infer that we did not engage in price-fixing and that whatever we were doing in the way of combination was not the kind of thing contemplated by the statute.

"Furthermore, a very vital element in this case is intent and purpose, which can be determined only by presenting the facts and circumstances," he added.

Replying, Chaffetz said the government has shown that the defendants formed together, acting in concert, to purchase gasoline on the open spot market and thereby raised the price of gasoline.

"If they did that they are guilty under the law," Chaffetz contended. "They can show that they didn't do that. But they may not show, by way of intent, that there was some justification for them in doing that. They may not show that under the code there was some purpose to raise the price because the code also indicated the ways in which that was to be done. And they can't show that the things they did were under the code — I don't think they are going to try to.

Aside From The Code

"Then, there is also the attempt — aside from the code — to show that what they did was for some justifiable purpose of conserving the nation's crude oil supplies, maintaining a stable price for crude or gasoline," Chaffetz added. "These things are irrelevant and all circumstances bearing on them are irrelevant and are only to bury in the issue in an economic controversy."

Donovan in reply said the defense ought to be permitted to show who fixed the price of crude, when it was fixed, and what was done by the government "because it appears that much of this case swings on the price of crude." He pointed out that the government had dwelt upon oil prices in 1935, comparing them with those of years as far back as 1930.

"We are entitled to show that we did co-operate with the government in obtaining the objectives the government laid down, and if in doing that there were certain acts done that affected the price; we say that is no violation of law," Donovan insisted.

"This is a case not of fixing prices but of affecting prices and we are entitled to show exactly what occurred in our proof of that fact," the defense counsel added.

Government Attorney Crawford contended that defense counsel was arguing that the defense counsel wants to go into the question of how much it costs to produce crude oil, to refine it and market it, and that the price of gasoline "at the time they entered into this conspiracy was too low so that they had a right to conspire and violate the anti-trust law for the purpose of getting more profit."

Stone Cites Sherman Law

Judge Stone, who had listened silently to the argument up to this point, interposed to say:

"Getting back to the question —after the NIRA expired the teeth of the Sherman Act clicked with the same force and vigor as before. If you were operating under the code prior to that time, you might show justification for that act."

If so, then the first thing to do is to show that the NIRA statute was compiled with, the judge added.

Donovan replied that, as stated in his opening statement, his defense was based on two grounds — not only upon the sanction in the code, but also on the Sherman Act itself as interpreted by the courts.

"We feel that we are entitled to show what was done under the code, not to give us immunity from anything we may feel may have been wrong — because we deny that we did anything wrong — but as showing that the intent and purpose and objective was the same as what the government had in mind."

During Donovan's argument on this, Judge Stone reiterated that the Sherman anti-trust law "was still in force" after the NIRA and the codes were declared invalid. Up to that time, he said to Donovan, if the defendants were acting under the code, they can prove they were to show "some justification" for their conduct.

"On Another Road"

"But after that time you were on another road," the judge told the chief defense counsel.

Chaffetz contended that if what the defendants were doing was "calculated to carry out the purposes of the code, and legitimately so, then they would have had no difficulty in getting approval of their conduct — at least while the code was in effect."

"The fact that the defendants are unable to show, at Your Honor's request, that they did bring their activity within the code, is a conclusive answer to any suggestion that they were doing what the code was intended to accomplish," Chaffetz argued.

Chaffetz said Donovan's claim, in effect, was that although the defendants didn't bring their activities under the code, by getting the proper approval as provided in the code, they decided for themselves what should be done to carry out purposes of the code and went ahead and did it themselves.

"And now they come in and say that what they did was for the best interests of the code," he added.

Chaffetz declared that the only reason for the provision in the NIRA suspending the Sherman anti-trust law was because it was recognized that those things which might be permitted under the code might be inconsistent with the Sherman law. He said further that the suspension was granted only under conditions set forth in the NIRA itself, namely, governmental supervision and regulation.

The government attorney said that Donovan had not said the defendants had got the Sherman law suspended by going to proper governmental authorities for that purpose.

Chaffetz concluded this argu-

Lawyers Confer On Madison Case With Cummings

By Teletype
N. P. N. News Bureau

WASHINGTON, Nov. 30. — Justice Department officials today revealed that three of the government attorneys prosecuting the oil case at Madison, Wis., came to Washington for a conference with Attorney General Cummings, Nov. 27, accompanied by four members of counsel for defendants in the case, who also took part in the conference.

They declined to discuss the conference, however, which came just as the defense was ready to begin presentation of its case to the jury.

At the department it was announced that Col. W. J. Donovan, chief defense counsel; Frederick Wood, Sinclair attorney; C. I. Francis, Pure Oil attorney, and one other defense attorney sat in on the parley with Cummings, Robert H. Jackson, anti-trust division head, and H. E. Chaffetz, J. H. Lewin and W. P. Crawford, attorneys prosecuting the Madison case.

Department officials declined to comment on reports published under a Washington dateline in The Wall Street Journal today which said "it is understood that a possible settlement was discussed."

Threat of Cut in Crude Price Cited

ment with a demand that the court "rule now that that kind of defense will not be permitted in this case and that counsel must confine himself to the issue presented in the indictment, namely, whether these buying programs were operated or not, and whether they were for the purpose of raising prices."

Straw Man

Replying, Donovan declared that for a good many weeks government counsel "have put up a straw man and said that was my position and then knocked the straw man down". He insisted that the prosecution misunderstood the position of the defense.

"We are saying here," Donovan explained, "that what we did was to attempt to remove abuses and abnormal conditions, and restore healthy competitive conditions; that was our purpose and that was what we succeeded in accomplishing, and we are entitled to show all of those facts and circumstances as bearing upon knowledge and intent."

Donovan said that conceding (but not admitting) that prices were affected, but not fixed, then if that was incident to the correction of abuses and to the removal of abnormal conditions, "we were not guilty of any violation of the Sherman Act."

Counsel for both sides then argued back and forth over the Trenton Potteries case and the Appalachian case involving the element of "reasonableness" in anti-trust law cases.

Further along, Judge Stone again asked if there was to be any proof by the defense that they were operating under the code.

Calls For Evidence

"If there is," the judge added, "then I say now that before we go into other matters, I think the defense ought to present that evidence now, to show that there was a compliance with the NIRA statute."

Donovan replied that the defense believes the defendants did comply with the statute.

"If Your Honor will view the evidence that we offer at that time, when we come to the code, then it can be passed upon, but we are dealing now with general conditions in the industry," Donovan said.

A few minutes later the court permitted Franklin to answer the long-pending question, namely, the relation of the price of crude to conservation. Franklin replied, in effect, that conservation could not be considered apart from price.

Donovan then swung the questioning into other lines, asking about storage capacity of independent producers and royalty contracts.

Another argument broke out a few minutes later over Donovan's question about the effect of low crude prices on the independent producer.

Chaffetz contended that it was "immaterial" inasmuch as prices were up and stable at the time of the alleged conspiracy.

"Suppose we show that the government fixed the price of crude," Donovan asked.

"What of it," Lewin and Chaffetz chorused, "it has no connection with this case."

"And it has no connection with buying pools," Lewin added.

"Suppose we show there was no buying pool," Donovan came back.

"Do it, that's the issue," Lewin snapped.

"You took seven weeks in an attempt to show there were buying pools, we ought to have three or four days," Donovan retorted.

The question then turned to why Franklin's refinery, which shut down in March, 1935, after operating since 1916, had not closed in the fall of 1934. Franklin replied that it was because Secretary Ickes was considering a plan to raise tank car prices of gasoline.

Judge Stone permitted the question to be asked but granted a motion to strike the answer.

Because of $1 Crude

A spirited clash developed as Donovan sought to bring out why Franklin's company went into receivership in 1933. Finally, the witness was permitted to answer. He said it was because with crude at $1 the refinery could not make a profit at the then-existing price of gasoline.

He pointed out also that, although his company had brought in many big wells, "proration finally got us down to only about one-half of one per cent of our production."

Judge Stone remarked that many things entered into the question of why a business firm could not operate at a profit and Chaffetz pointed out that the court had used similar reasoning in overruling the government's question of its jobber-witnesses about their lack of profits.

Goldthwaite Dorr, Socony-Vacuum attorney, then argued briefly, citing Lewin's reference to the chart of price increases as "golden stairs of avarice and greed." He contended that the defense should be permitted to show that the bottom step was "subnormal" prices and that the Connally Law and other factors (including major company buying) had only "released" the industry from conditions creating these "subnormal" prices.

Commenting on the argument over whether Franklin's case was "typical" of independent refiners losing money, Judge Stone said the matter could be better arrived at by getting the cost of crude, cost of refining and cost of marketing.

A few minutes later the judge declared a recess until Nov. 30 as government counsel objected to Donovan's questioning of Franklin to bring out the information suggested by the court.

"Motive No Place"

Resuming his examination of Franklin at the opening of the morning session Nov. 30, Donovan asked what price of gasoline was required for a non-integrated refiner to recover his cost with $1 crude.

Immediately, the argument of the previous day was resumed in front of the jury.

Chaffetz argued that the defendants should not be permitted to defend themselves on the ground that independent refiners benefited incidentally from their activities, adding that the major companies controlled 85 per cent of the market so they reaped the biggest benefit.

Judge Stone remarked, "motive or lack of motive has no place here."

Frederick Wood, Sinclair attorney, contended that as part of the indictment charges that the majors paid "high and arbitrary prices" the defense should be able to show what it cost independent refiners to produce gasoline.

Chaffetz said the only question, as laid down in the Trenton Potteries case, was whether the price of gasoline was fixed by concerted action of the defendants. He said that it would be impossible to determine the cost of each refiner, adding that "cost is not a factor in a price-fixing case."

Presumption of Innocence

T. W. Brazeau, Cities Service attorney, urged that the court instruct the jury that the "presumption of innocence" is still with the defendants, which the Judge did.

Judge Stone then warned counsel on both sides, "there was too much talk here yesterday that was for the benefit of the jury and not the court."

Franklin was then permitted to testify that a study by the P. & C. Committee showed that the average cost for gasoline non-integrated refiners with $1 crude was 5.5 cents.

Government counsel fought against any further testimony about costs. Judge Stone was reluctant to permit Franklin to continue such testimony unless the cost of major companies were also presented. Donovan said the case of the defense would be developed step by step.

All the while the jury was still in the box. Donovan went to the bench along with government attorneys and there was a whispered argument at the side of the bench for 15 minutes.

Donovan had scarcely started his examination of Franklin again before the objections began once more. The witness was asked why independent refiners did not cut the price of crude in the fall of 1934.

Jury Sent Out

After sustaining the government's objection, Judge Stone excused the jury and then asked what Donovan expected to prove.

Donovan then told about how independent refiners in the Mid-Continent had threatened to cut crude prices unless they received relief, of a visit to Secretary Ickes by the P. & C. Committee during which it was stated that "the code is out the window if there is a crude cut," of how Ickes telegraphed I. A. O'Shaughnessy (Globe) urging him not to cut the crude price and telling of steps to combat "hot" oil and about "other relief plans" for the independent refiner.

Donovan summed up the plight of the independent refiner at the time and Ickes' assurances of relief, arguing that defendants were entitled to infer that the oil administration "sanctioned" informal and co-operative activities to carry out the objectives of the oil administration to attain a fair relation between the prices of crude and gasoline.

The Real Issue

Replying, government counsel contended that Donovan was proferring "immaterial" evidence. They contended that under the NIRA, the government might have had power to raise prices, but not the defendants.

"The fact that the price of gasoline was not reasonable is no excuse for the defendants to combine and raise prices," Chaffetz argued.

Lewin declared that the court

(*Continued on page* 22)

Mid-Continent SKYLINE

By LAWRENCE E. SMITH, N. P. N. Tulsa News Bureau

TULSA, Nov. 27

The Most Puissant Lon A. Smith, member of the Texas Railroad Commission and Defender of the East Texas Faith, is out with his almost-monthly pronunciamento. He argues that the operators of East Texas wells should be allowed to make up the production they are losing by reason of the Sunday shutdowns.

Commissioner Smith is strictly a home-town umpire in this oil and gas regulation game. He originated around Henderson, which is on the southeast fringe of the East Texas field, separated from actual oil wells by several miles of piney woods and cotton fields, but enjoying a considerable business nevertheless from the operation of the 24,000 wells now in the field.

He has asserted in his speeches that his hope is to be buried in Henderson. But he doesn't want to be buried by ballots at election time in Henderson or anywhere else and he appeals to several thousand voters when he urges fatter allowables for the field.

With Commissioner Ernest O. Thompson absent in Washington it was up to Chairman C. V. Terrell to take the negative side in the intramural debate. He executed the neatest trick of the week when he quoted the attorney general broadly to the effect that it would be illegal and beyond the scope of the commission's authority to grant back allowables. The thin distinction between back allowables and those retroactive increases which come out of Austin frequently is identified only by an expert, but Chairman Terrell has taken his stance and we now wait for Col. Thompson to bust up the impasse.

It appears, on a recount, that there were a lot of wells which were not shut down Nov. 21, first of the Sunday closings. In fact, there were 6625 of them, according to reports from the field. The reason was that a severe cold spell hit the field and the demand for gas was high. These wells produced oil along with the gas, but that will be made up by shutting in on other days. Many of them were closed Monday for this reason. The allowable of each well is definite and the railroad commission will not approve tenders on the overage.

* * *

Court Bans Drilling

Lincoln Terrace is a residential district of about 80 acres lying southeast of the Oklahoma capitol. It is completely surrounded by oil wells. Some of the home owners have fought consistently to uphold plat restrictions and prevent drilling. Some say the damage has been done already and that they might as well get something out of it.

Among the latter class is W. S. Key. He put up a derrick in the yard of his spacious home. The city police came out and delayed the start of drilling. Last week District Judge Edgar S. Vaught, of federal court, ruled that plat restrictions prevented drilling—the same ruling that the state Supreme Court had previously made. Mr. Key said he would rush an appeal to the U. S. Circuit Court.

The Vaught ruling was in the form of a dismissal of Key's application, for injunction for the reason that the state court had already passed on the question. The question for the appellate court, therefore, will be on whether Judge Vaught should have taken jurisdiction.

* * *

Ark. Proration Again Delay

Another postponement, the third, of the effective date of proration in the Miller county, Ark., extension of the Rodessa field has been ordered by the Arkansas Board of Conservation. The new date is Jan. 1.

Originally announced for Nov. 1, proration was held up when some independent operators kicked. The plan was to hold production to 10,000 barrels daily. At that time it was around 15,000 barrels. The decline has been rapid and if it continues at the same rate for another month there will be little reduction to be made to equal the 10,000-barrel figure.

* * *

Bids Too Intricate

Gov. James V. Allred, Texas, as chairman of the Board of Mineral Development, has asked bidders to develop oil on state tracts to express themselves in language he and the state treasurer can understand. The bids have become so complicated, invoking the logarithmic tables, with a dash perhaps of astronomy and ending with two lateral passes and an onside kick, that the board has much trouble trying to decide who has made the high bid.

Here is one of the recent bids, no logarithms involved: State to receive 1/12 royalty until $1,065,000 has been paid and after operator has received $50,000 from each well out of ¾ of production, state shall receive an additional 3/20ths. Actual cash involved in this was $142.

Most of the land leased recently is riverbed and submerged coastal tracts and in the last year the state has taken in more than $2,000,000 —in cash, not logarithms. Operators try, of course, to lay out as little cash bonus as possible, for most of the land is wildcat.

* * *

Here and There

Operators in the Marion county section of the Texas end of the Rodessa field have formed an association to urge the Texas Railroad Commission to designate their part of the area as a separate field, with allowable production of its own. The purpose, chiefly, is to get an upward revision.

* * *

Another new association now a-borning is the Mid-Continent Water Flooding Assn. First meeting was held in Independence, Kans. R. R. Hawkins, formerly chief petroleum engineer and general superintendent of The Texas Co., Tulsa, was named temporary chairman. He is now associated with Kansas operators who are using the water drive.

* * *

An increase in the production of helium gas from the Amarillo, Texas, plant of the federal government will be made early in 1938. A recent act of Congress permits the sale of helium, under certain restrictions, to non-governmental users. The act also authorizes the Secretary of the Interior to buy two plants, one in Colorado and one in Kansas.

* * *

Magnolia Petroleum Co. has applied to the Oklahoma Corporation Commission for permit to build a carbon black plant in the Fitts field, Pontotoc county, Okla. It plans to use more than 20,000,000 cubic feet of gas daily from the company's gasoline plant.

Crude Oil Is Half Gulf Oil Tonnage

N. P. N. News Bureau

WASHINGTON, Nov. 29. — Shipments of petroleum and refined products from Gulf to Atlantic ports during July, 1937, totaled 5,111,202 tons (2000 pounds) of which over 2,500,000 tons were crude oil, 1,280,000 tons were gasoline, and 1,000,000 tons were fuel oil, the U. S. Bureau of Foreign and Domestic Commerce reported. Principal ports of shipments were Houston, Beaumont, and Port Arthur and principal receiving ports were New York and Philadelphia.

Corresponding figures for a year ago are not available. The bureau's statement from which the figures were taken is from a series started this year. Total shipments for June were 4,852,062 tons.

Oil Well, Home-Town Boy Make Good

INDEPENDENCE, Kans. Nov. 29.—Thurman Hill, home-town boy, made good on his promise to donate $500 to be used on the city park here.

Hill, who lives in Washington, promised to contribute the money if a well in which he was interested in western Kansas proved successful. It was and he did.

He is a former member of the Kansas Public Utilities Commission, now the Corporation Commission, and was quite active in the early 1930's in oil conservation-proration work. He was a member of the Oil States Advisory Committee, forerunner of the present Interstate Oil Compact Commission.

W. J. Bovaird Dies

N. P. N. News Bureau

TULSA, Nov. 29.—William J. Bovaird, chairman of the board of Bovaird Supply Co., died at his home in Independence, Kans., Nov. 25. He was 74 years old.

Mr. Bovaird was born in Shamburg, Pa., and learned the supply business in association with his father at Bradford, Pa. He came to Independence in 1903 and established the Bovaird Supply Co., of which he was manager until 1925.

He is survived by his widow, three sons and four daughters.

Says Defendants Flouted Government

(*Continued from page* 20)

at last was face to face with the real issue in the case and must now decide whether this was a price-fixing case, and thus within the Trenton Potteries case barring evidence of "reasonableness," or within the Appalachian Coals case in which the court permitted evidence of "reasonableness" after finding that the defendants were unable to control the market.

A few minutes later the bitterest clash of the trial so far occurred between Lewin and Donovan.

Rival Attorneys Battle

Then chief defense counsel asked Lewin if, assuming that the present case might fall within the Appalachian Coals case, should not the defendants be allowed to present evidence which would bring them within the Appalachian case.

Lewin said that was a "violent assumption." He contended that because a lawyer once won a victory (Donovan was defense counsel in the Appalachian case) he ought not to drag out the decision in every case thereafter.

"In view of the defense counsel's opening statement that he would show written approval under the NIRA and then his pro-offer of the code, how can this court take seriously now anything he says about proving that this case was within the Appalachian Coals decision," Lewin demanded sharply while facing Donovan.

Col. Donovan jumped from his chair and advanced angrily toward the prosecution table.

"Don't be such a cheapskate, Lewin!," shouted the chief defense counsel in by far the loudest and most vigorous tones that he has yet used in the trial.

Judge Stone banged his gavel, silencing Lewin's reply.

The judge said he wanted no more of such argument.

Goldthwaite Dorr, Socony-Vacuum attorney, in a placid voice, then made a brief argument on the point that the major companies couldn't sell to their jobbers at whatever price they wanted because they were bound by what the independent refiner was charging his jobbers.

Purpose of Dorr's argument was to show that the independent major companies did not control the market.

Taking up his argument again after the noon recess, Dorr recounted conditions in the producing and refining branches of the industry in 1933-35. He said that there were only two ways of relieving the distress of independent refiners — either the price of crude must be cut or gasoline prices raised.

"The policy of the federal government was that the price of crude would not fall except over the dead body of the Secretary of the Interior", the Socony-Vacuum attorney asserted.

Defendants' activities were a "reasonable effort" to accomplish the objective of a national policy, Dorr argued.

So, defense counsel should be permitted to show facts and circumstances bearing on this, he added.

Wood, Sinclair attorney, pointed out that the evidence shows independent refiners planned to relieve themselves by cutting the price of crude, but were blocked by Ickes urging them not to adopt this course.

Jail All Refiners

"The golden stairs which Mr. Lewin talked about were caused by the refiner control program under the code promulgated by President Roosevelt," Francis contended.

Replying, Chaffetz said that under Francis' theory, the Department of Justice should have jailed every independent refiner who paid $1 for his crude and sold gasoline at a price below cost of recovery.

The government attorney contended that the code prohibited any formal or informal agreement unless first approved by the President.

"Were these refinery allocations approved by the government?" Judge Stone interposed to ask. Chaffetz said yes, and the Judge said he thought that defendants should be permitted to show that in evidence.

"Absolutely," Chaffetz added, "and there is evidence in the record on these refinery allocations, put in there by government witnesses."

Chaffetz contended that effectiveness of the buying program was enhanced by the Connally law and the refinery allocations. He admitted that these may have been factors affecting price, but insisted that they alone were not responsible. He said they were the "floor" and that without them the alleged buying program would have failed, as had other such "programs" in the previous year.

Guilty Either Way

The inference was that the refiners would be allowed to take the other alternative—to raise gasoline prices to a "proper parity" with crude.

If the refiners in their meeting had "agreed" to cut the price of crude to 60 cents and gone ahead with their plan, he said, they might be subject to prosecution under the anti-trust laws. On the other hand, if they "agreed," as requested by Ickes, to withhold a price cut, they might also have been liable, he added.

"Under the theory of government counsel here," Wood added, "these refiners would be guilty if they couldn't produce some formal document signed by Ickes and approving their plan to cut the crude price or ordering them to maintain the crude price."

Replying, Lewin contended that there was a legal way of raising gasoline prices to the 18.5 parity provided for in the code but that the defendants preferred to flout their government and do it illegally.

The government attorney contended that it would be impossible for either side to present all the facts and circumstances because of the limitation of rules of evidence.

Cites NIRA Code

Charles I. Francis, Pure Oil attorney, next took up the argument. He said that the defendants had two defenses, the fundamental defense being that there was no price-fixing program, but a reasonable co-operative effort to eliminate unfair competitive conditions, namely, the dumping of surplus gasoline on the market at below-cost prices.

Any evidence on why we bought gasoline or why the price of gasoline went up is admissible, Francis contended.

"If I am charged with murder, can't I say that I killed in self-defense or show other circumstances to prove my innocence?" he asked.

Turning to the requirement of formal written approval in the code, Francis said this was required only, for example, if competitors signed up to an agreement to buy as a pool. He denied that there was a gasoline buying pool, as charged by the prosecution.

Francis cited the provisions of the code against selling at a price below cost of production plus a reasonable profit, pointing out that, under Section 5, of the NIRA, "actions in compliance" with the code were protected against the anti-trust laws for 60 days after the code expired.

Weymouth Kirkland, Standard of Indiana attorney, said the government contended that the power to fix prices depends upon the power to control the market. Kirkland declared that the evidence would show that the defendants remaining in the case could not control the market. He pointed out that Sun, Standard of New Jersey, Gulf, Texaco, Ohio Oil and others were marketing in this territory.

Lewin said the defendants wanted to present a "cry-baby" defense to the jury—to contend that what they did was intended to attain objectives of the code even though they had no approval of their activities.

"Instead of this, your honor, they should save that and present it to you after their conviction in mitigation of their offenses when you are about to pass sentence," Lewin said.

J. C. Denton, Mid-Continent attorney, then added a few words about "instigation and entrapment," which he said was proper evidence in a criminal case. He pointed out that in no other Sherman Act case was there ever an industry involved which at the time was "under straight-jacket control of a code." He said that the court ought to receive evidence of government buying pools and of defendants' code activities.

H. H. Thomas, Madison, another defense attorney, concluded the argument, insisting that the defendants were entitled to build their defense based on any theory they see fit, and should not be limited to the prosecution's theory of the case.

Judge Makes Ruling

Judge Stone then ruled that the defendants would be permitted to show anything which affected the price of gasoline in 1935 and 1936. He said that the price of crude was set at $1 in 1933 and remained at that figure until 1936, so he had his doubts as to its effect on a rise in gasoline prices during this period. For this reason, he said, he would sustain the government's objection to Donovan's question about independent refiners' threat to cut crude prices in the fall of 1934. However, he added, this should not be taken as indicating how the court will rule on a similar question, should it arise later.

"If the defendants base their appeal on the Appalachian Coals case," the Judge added, "they can put in evidence which tends to show that this case is under that decision and I will rule on each offer of evidence as it comes."

Court was then adjourned until Wednesday morning. The jury was not in the court room at all today, except for about an hour of the morning session.

Oklahoma, Kansas Reduce Allowable

N. P. N. News Bureau

TULSA, Nov. 29.—Reductions in allowable production ordered by the Corporation Commissions of Kansas and of Oklahoma are encouraging developments in the seasonal attempt to bring supply and demand more nearly into balance.

The Oklahoma commission held its monthly hearing Nov. 26, heard numerous statements from purchasers of oil to the effect that production of the state exceeds demand, issued an order setting the daily allowable for December at 550,000 barrels daily. This is 25,000 barrels daily under the November allowable and 38,800 barrels daily less than the U. S. Bureau of Mines forecast of demand.

In establishing this figure, the commission went 10,000 barrels under the recommendation of W. J. Armstrong, its chief conservation officer. Incidentally, the Oklahoma allowable is on a 97 per cent basis—the same plan on which oil is purchased; Kansas allowables are on the same basis. Texas figures mean 100 per cent measurement. Hence, Oklahoma and Kansas actual allowables are somewhat higher than the stated figures.

Kansas set its allowable for December at 176,600 barrels, which is 3615 barrels under the November daily allowable and 9400 barrels under the Bureau of Mines estimate.

Louisiana's December total was set by its state Conservation Department at 253,975 barrels daily, 825 barrels higher than for November. No important changes in field schedules were made. The Bureau of Mines had recommended 244,000 barrels daily.

The New Mexico allowable was expected to be substantially the same for the first half of December as for the last half of November, 104,800 barrels daily.

DAILY AVERAGE PRODUCTION IMPORTANT DISTRICTS
American Petroleum Inst. Figures

	Week Ended Nov. 27 Barrels	Week Ended Nov. 20 Barrels
Oklahoma City	125,600	148,900
Total Okla.	567,800	590,000
East Texas	416,050	484,600
Total Texas	1,321,950	1,430,400
Rodessa	44,150	45,250
Total La.	242,700	244,050
California	700,500	712,000
E. of Rockies	2,725,300	2,861,850
Total U. S.	3,425,800	3,573,850
Crude imports	46,860	86,860
Tot. new sup'ly	3,472,660	3,660,710

Oil Trucking Increases

WASHINGTON, Nov. 29.—Truck loadings of petroleum and products in October were 12.4 per cent over October 1936, the American Trucking Associations report in its monthly report on loadings.

Seasonal decline, however, brought October loadings 26 per cent under loadings for September, 1937, the A.T.A. reported.

Refinery Recounts 18 Months' Gain

N. P. N. News Bureau

TULSA, Nov. 29.—Completion of an expansion program at the Monument (N. Mex.) natural gasoline plant of the Warren Petroleum Co. is announced by H. W. Harts, in charge of plant operations, in the company's November issue of its house organ, "The Natural Gasser."

Within 18 months the plant has grown from handling 5,000,000 cubic feet of gas daily and manufacturing 3000 gallons of gasoline, to handling 30,000,000 cubic feet of gas and making 30,000 gallons of gasoline. The plant is served by a pipeline gathering system connected to 300 wells on a 25-square-mile area. There are 110 meters scattered throughout the sand hills and prairies, Harts said.

"A small refinery," Harts stated, "is operated in conjunction with the gasoline plant, and a certain amount of liquefied gases, principally butane, are manufactured. These two products enable the plant to be a great deal more flexible and produce practically any product asked for by the purchaser.

Plant Crude Runs Down 41,000 Bbls.; Motor Fuel Stock Up 823,000 Bbls.

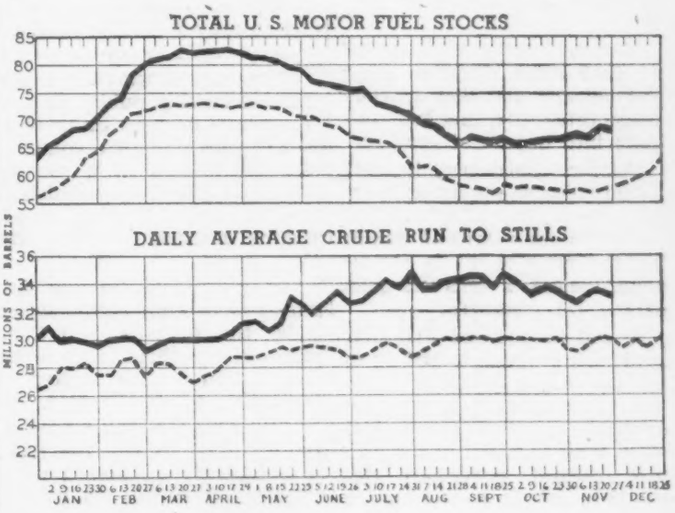
N. P. N. News Bureau

NEW YORK, Nov. 30.—Despite a decrease of 41,000 barrels in daily average crude runs to stills, stocks of motor fuel gained 823,000 barrels the week ended Nov. 27, according to the American Petroleum Institute. Gas and fuel oil stocks increased 425,000 barrels. Reporting plants were operating at 81.2 per cent capacity, compared with 82.3 per cent the previous week.

The largest decrease of the week in crude runs was at Texas-Gulf plants, where a 47,000 barrel decrease was reported. East Coast plants reduced runs 26,000 barrels, Inland Texas 21,000 barrels, and Appalachian 12,000 barrels. Increases were reported by California refineries, where runs were increased 31,000 barrels, and at Indiana-Illinois-Kentucky plants where they were up 23,000 barrels.

Motor fuel stocks at refineries totaled 35,834,000 barrels Nov. 27, an increase of 610,000 barrels over the previous week. In-transit and terminal stocks increased 244,000 barrels, to 22,447,000 barrels. Stocks of unfinished gasoline declined 31,000 barrels, to 6,503,000 barrels.

In the various refining districts, motor fuel stocks increased 387,000 barrels in Indiana-Illinois-Kentucky; 156,000 barrels in the East Coast; 146,000 barrels in Oklahoma-Kansas-Missouri; 174,000 barrels in Inland Texas and 110,000 barrels in the Rocky Mountain area. Three declines were reported. Stocks at Texas-Gulf plants declined 183,000 barrels, at Louisiana Gulf, 157,000 barrels and in California, 27,000 barrels.



CURRENT REFINERY OPERATIONS

Districts	Per Cent Capacity Reporting	Daily Average Crude to Stills (Barrels) Week Ended		Per Cent of Reporting Capacity Operated Week Ended		Stocks Thousands of Barrels: Total Finished and Unfinished Motor Fuel*		Stocks Thousands of Barrels: Total Finished and Unfinished Gas & Fuel Oil*		Cracked Gasoline Production: % Total Capacity Reporting	Cracked Gasoline Production: Daily Av. Production (Barrels) Week Ended	
		Nov. 27	Nov. 20	Nov. 27	Nov. 20	Nov. 27	Nov. 20	Nov. 27	Nov. 20		Nov. 27	Nov. 20
East Coast	100.0	521,000	547,000	77.9	81.8	17,602	17,446	14,598	14,852	100.0	118,000	115,000
Appalachian	88.4	106,000	118,000	82.2	91.5	2,815	2,688	1,044	1,004	94.6	23,000	29,000
Ind., Ill., Ky.	92.4	458,000	435,000	93.7	89.0	10,148	9,761	7,441	7,461	98.3	141,000	146,000
Okla., Kans., Mo.	84.7	278,000	274,000	72.6	71.5	6,215	6,069	3,907	3,969	90.3	71,000	74,000
Inland Texas	56.6	134,000	155,000	66.7	77.1	2,269	2,095	1,813	1,937	71.7	35,000	45,000
Texas Gulf	95.7	712,000	759,000	89.3	95.2	9,361	9,544	12,204	12,049	98.0	159,000	175,000
La. Gulf	96.6	143,000	141,000	85.1	83.9	1,754	1,911	3,463	3,524	100.0	32,000	26,000
No. La., Ark.	63.7	53,000	56,000	91.4	96.6	481	391	523	488	77.5	7,000	9,000
Rocky Mt.	69.7	56,000	48,000	90.3	77.4	1,476	1,366	656	625	85.4	17,000	16,000
California	90.9	545,000	514,000	73.1	68.9	12,663	12,690	72,717	72,032	98.0	71,000	80,000
Total Reporting	89.0	3,006,000	3,047,000	81.2	82.3	64,784	63,961	118,366	117,941	94.8	674,000	715,000
Estimated U. S. Total (Bur. of Mines Basis)		3,325,000	3,365,000			68,544	67,661	121,616	121,191		715,000	790,000

*Includes stocks at refineries, in bulk terminals, pipe lines and in transit.

Governors Wired By Marland For Oil Price Confab

(*Continued from page* 9)

rent production exceeds demand.

"Several million barrels of oil have been added to surface storage over the past year," he wired. "This entails waste. This situation affects the price of oil. The price already is lower than the cost of production from thousands of wells. A continuation of overproduction threatens still lower prices for our oil and the consequent abandonment of thousands of our wells, which causes underground waste."

Is Conservation Move

Reminding the governors that the federal administration is now planning for soil conservation, price control and limitation of production of agricultural products, Marland asserted that it was the function and duty of the governments of oil producing states to effect such conservation in the interest of national defense and public welfare.

Marland has repeatedly asserted that price governs supply and demand and that a proper conservation program must take price into important account.

Such a conference, he said, would "discuss ways and means to prevent overproduction of oil, and ways and means of stabilizing the price of oil to prevent abandonment of wells and waste of our oil resources."

It will be recalled that Marland took the lead in setting up the Oil States Compact, which has never grown beyond the original six states. He attempted to have included in the compact several provisions that would be certain to affect price, but Texas refused to enter into any agreement that went beyond physical waste prevention.

* * *

The first reply to the Marland proposal was an emphatic and sharply worded refusal by Gov. James V. Allred of Texas, who characterized it as an attempt at interference with price and therefore as an evasion of law and contrary to sound public policy.

Governors Bailey of Arkansas and Huxman of Kansas replied they would sit in such a conference. The Arkansas governor, mindful of his state's interests generally, suggested that the meeting be held at Hot Springs.

Governor Allred's reply was as follows:

"I have your telegram with reference to alleged conditions in the oil industry and proposing a conference to frankly discuss and deal with price fixing of crude petroleum and consequently its products. You state in your telegram that such a conference could not be held by oil producing companies whose interest is solely in profit without possible violation of our anti-trust laws but in your opinion may properly be held by the executive officers of the several oil producing states.

"So far as I am concerned this statement on your part answers your proposal for this conference.

"In the first place I know of no exemption of state officers for violating the federal anti-trust laws and, in the second place, even if it were not a violation of the law I would not care to be a party to doing something indirectly for these companies that cannot be done directly by them.

"In all frankness, my dear governor, this gets back to the battle that has been constantly waged throughout the history of the oil industry, and particularly during our negotiations on uniform conservation measures to prevent physical waste. As I have always insisted, this is as far as the states can legally go, and morally I think it is as far as they ought to go.

"The oil consuming states and consuming public in general would have as much right to complain against a combination of officials in a few oil producing states to artificially fix the price as they would against individuals doing the same thing.

"In my opinion many fine things have been accomplished under the Interstate Oil Compact, which authorizes, however, co-operation in the matter of preventing physical waste.

"Under all the circumstances, and granting to you the right to a contrary opinion, I must respectfully decline to participate in the price-fixing conference you propose."

New Book On Greases Off Press Dec. 10

CLEVELAND, Nov. 30. — "Lubricating Greases, Their Manufacture and Use," a new book by E. N. Klemgard, lubricating engineer, will be off the press Dec. 10, the National Petroleum Publishing Co. announced today.

The price of the new volume of 872 pages is $15. Books may be obtained from the National Petroleum Publishing Co., 1213 W. 3rd. Street, Cleveland, O.

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The Best Crude for the Job

By ARCH L. FOSTER, Technical Editor

The refining industry is coming more into its own by using greater care in the selection of the sources for a given type of product. For decades we have followed that plan for motor lubricants; the Pennsylvania part of this industry thrives because it devotes a special crude to the manufacture of a product for which it is best fitted—lubricating oils.

Such has not been the case for motor fuels, except in isolated instances. The quantity of gasoline demanded by the American motorists, the developments of the cracking technologists, have necessitated and made possible the use of most any crude as cracking stock, and has made that stock yield at least an economic percentage of fuel of competitive qualities. As special fuels come more into demand, we are finding it necessary to study the crude possibilities and to use for a given purpose crudes possessing the constituents and properties most suitable for those purposes.

Especially is this true for aviation fuels, in some cases. Certain peculiar crudes contain straight-run fractions very high in anti-knock rating; California is notable in this respect, and for years the average octane rating of motor fuels on the west coast have been higher than elsewhere. Large quantities of aviation fuels have been made from the same fuels, avoiding the penalizing of cracked products which some engines inflict. Other crudes of this general type exist, such as some of the South Texas crudes. A small number of refiners are reported to be making high antiknock fuels straight from these crudes, wih octane number well into the 80s.

With the present rapidly upward trend in aviation fuels in octane number, it stands to reason that wider and better use can be made of these fuels to make such special products. The refiner who can and does not take advantage of such a chance is overlooking a bet.

* * *

A Kingdom for Simple Words

The befuddling clarity of expression, the stupefying exactness of terminology of the technical man—including editors—frequently has us in stitches—and blank bewilderment. One of the most recent gems to come within our range is the following from advertising copy, in which a Ph.D., gets playful with the layman, by explaining in words of one cylinder (?) the principle of a new pump:

"No attempt will be made here to describe how this extraordinary pump works—except to say that a helical, eccentric rotor rolls with a hypocycloidal motion in a stator moulded to form an internal double helix. The liquid is continuously forced ahead of the rolling action, as by piston in a cylinder of infinite length."

What on earth would have happened to the linotypist, and to the readers, had he started to get technical? Now all we want to know is, how does the blasted thing work?

* * *

That Chemists May Learn About Oil

Refining technology continues onward and upward to new heights, new objectives formerly believed impossible to realize. In all of the fuss and furore brought about by the interest of lubricating technologists in the ever-increasing number and seriousness of problems involving film strength, oiliness, oxidation stability, viscosity-temperature properties and others considered more and more important in a motor oil, it is refreshing to read the following statement alleged to have been made by one of the higher officials of a refining company, in announcing to the daily press the sale of a new motor lubricant:

"In a recent test for several hours under terrific heat conditions we discovered that its ratio of viscosity at 210 degrees is comparable to its viscosity at 100 degrees. *This is the same ratio that has been determined for. . . . . paraffin base oils.* . . . . In automobile tests we found that the oil functions splendidly in every respect and does not thin out after being repeatedly heated and circulated through the motor."

We respectfully commend this statement to Messrs, Dean, Lapeyrouse and Davis, as having without doubt a momentous bearing on any revision of the Viscosity Index principle which may be under consideration by them.

Refining Technology

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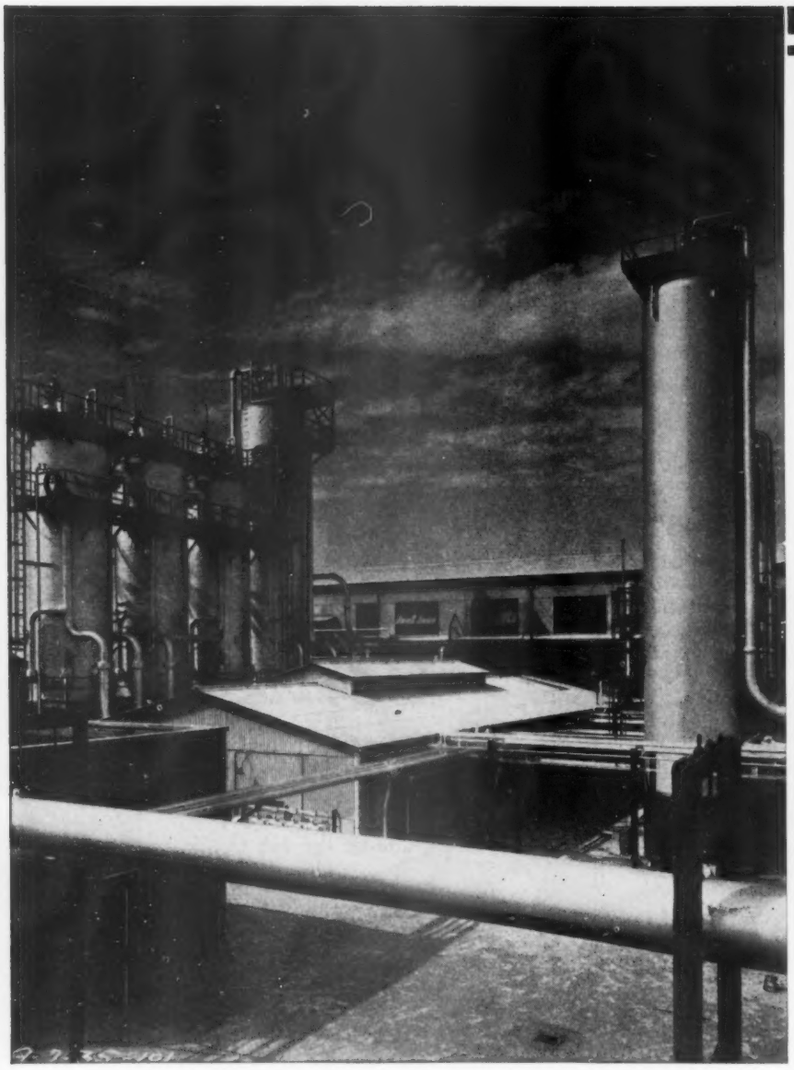

THE MANUFACTURE OF LUBRICATING OILS REQUIRES A HIGHLY SPECIALIZED KNOWLEDGE OF PROCESSES—EQUIPMENT—CONSTRUCTION AND OPERATING CONDITIONS

Kellogg-built lubricating oil process units have incorporated in their design the benefits of the latest advances in research development and engineering experience.

As licensing and construction agent for the JUIK processes, Kellogg offers refiners a choice of various combinations, as shown to the left.

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Value of Polymerization in Natural Gasoline Plant Operations

By HENRY N. WADE†

● During the past two years several papers have been published bearing on the practical operation of polymerization processes. Much of this material, however, advocates one or another of the commercial processes now available. Much of it is also confused, from the standpoint of the natural gasoline manufacturer, by being based on "combination" operations, in which light products from oil cracking make up part or all of the feed to the polymerization unit.

The purpose of this paper is to present, in an entirely general and disinterested way, information regarding the present state of the polymerization art as applied to the conversion of the light materials which can be derived from stabilizer discard in the ordinary natural gasoline plant. From the standpoint of the natural gasoline plant owner, an attempt is made to answer the following questions:

1. What is the general purpose of polymerization?
2. What commercially successful processes are now available?
3. How do they operate?
4. How much and what do they produce?
5. What is the plant investment cost?
6. What is the operating cost?
7. Under what conditions will a polymerization plant pay?

Henry N. Wade

THE general purpose of polymerization is, at least partially, to conserve for use as motor fuel materials in the stabilizer discard, which in many natural gasoline plants are either wasted or else used for low grade fuel purposes. By polymerization, the butanes, and to some extent propane, are partially converted into liquids having a normal gasoline boiling-range. Consequently they can be stored economically and handled with normal facilities.

In addition to conserving materials which might otherwise be wasted, it has been found that polymerization produces fuels having uniquely valuable properties.

Two general types of plant are in commercial use: the straight heat-pressure-time type plants and plants in which a catalyst is used to assist in the conversion.

The "Unitary Thermal Polymerization Process" is representative of the first type. This process is owned and licensed by Polymerization Process Corp. through its licensing agent, M. W. Kellogg Co. This process was developed jointly by Phillips Petroleum Co., Standard of Indiana, Standard Oil Development Co., The Texas Co., and M. W. Kellogg Co. The first commercial plant* using this process is the Alamo refinery of Phillips Petroleum Co. at Borger, Texas. This plant began successful operation around 1933, and has been increased in capacity several times since then.

It is obvious that many modifications of this type of operation are possible, depending both upon the nature of the raw feed and upon the nature of final products desired. One such modification is described by Ridgway, Wagner and Swanson in NATIONAL PETROLEUM NEWS, Nov. 4, 1936.

The Dubbs Catalytic process, is, so far, the only commercial application of a catalytic process. This process is owned and licensed by the Universal Oil Products Co. The first commercial plant using this process for converting straight natural gasoline plant stabilizer discard was placed in operation in March this year at the McKee gasoline plant of the Shamrock Oil and Gas Corp. in the north Texas Panhandle.

Schemes of Operation

In order to make a heavy, gasoline-range hydrocarbon out of light raw materials, propane and butane, it is obviously necessary to induce two or more molecules of light materials to join together, forming a new molecule containing more than three or four carbon atoms, and consequently having a higher boiling point than the original propane or butane. Unfortunately, propane and butanes extracted from natural gas belong to the "saturated" or paraffin series of hydrocarbons, and are very inert chemically. On this account, no direct method has yet been discovered

†Parkhill-Wade Inc., Los Angeles.

*Discussion of plant operation by J. S. Carey was published in Refr. Nat. Gas. Mfgr., Dec., 1936.

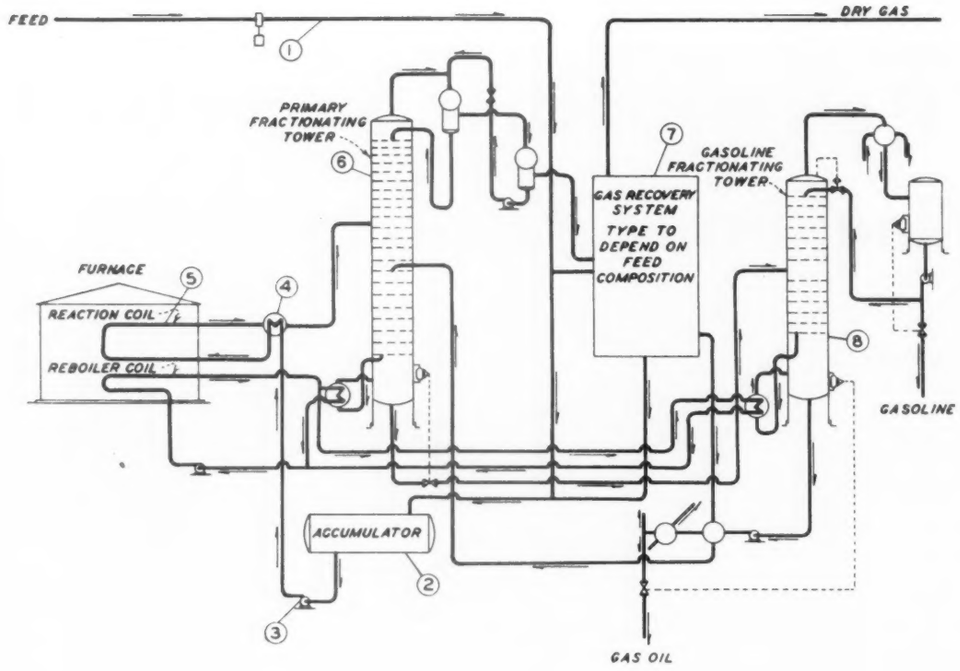

Fig. 1. Flow chart for the Unitary Thermal polymerization process

for making the light paraffins combine together to form heavier ones.

However, it has been found that by subjecting light paraffins to heat and pressure for a suitable length of time, they are broken down into other types of hydrocarbons which are "unsaturated", or contain more carbon relative to hydrogen than do the paraffins, and which are relatively active chemically. Light unsaturated compounds so produced can then be made to combine with each other to form heavier compounds, either by a suitable continuation of the heat-and-pressure treatment, or by the use of a catalyst.

Endless numbers and kinds of products may be produced by the initial breaking-down step, depending upon the degree of heat and pressure applied, and the time duration of treatment. Likewise the nature of the products of the final recombination may be widely varied by the same factors.

Without going into the almost infinite mass of possible reactions which can and do take place, the following illustrates the general idea.

Breaking Down Step

Feed—Propane C_3H_8 (Saturated) + H, P, T = Ethylene C_2H_4 (Unsaturated) + Methane CH_4

Feed—Butane C_4H_{10} (Saturated) + H, P, T = Propylene C_3H_6 (Unsaturated) + Methane CH_4

Polymerizing Step

Ethylene C_2H_4 + Propylene C_3H_6 ——— = Pentenes C_5H_{10}
Approx. Boiling Pt. 92° F.—Sp. Gr. 0.65

or

Propylene C_3H_6 + Propylene C_3H_6 ——— = Hexenes C_6H_{12}
Approx. Boiling Pt. 130° F.—Sp. Gr. 0.72

This is not intended to represent even a small part of the reactions which actually do take place. Some idea of the tremendous complication of these may be gained from the fact that an analysis of the total final products of an operation will show everything from hydrogen gas to extremely heavy tars.

Both the straight thermal process and the catalytic process, then, use the initial heat-pressure-time step for converting the paraffin feed stock more or less completely into unsaturates. In the simple thermal process conversion of light unsaturates into heavy ones is accomplished along with the initial breakdown in one operation. In the catalytic process conversion is partly accomplished by treating fractionated products of the break-down with a catalyst. In both processes the final step consists of fractionating out undesired products to yield a final liquid product of desired boiling range. Both processes also require some recycling of materials in the thermal stage, since the reactions do not carry through to completion in a once-through process. The recycle material is derived from fractionation following primary conversion, and is made up of unconverted paraffins and some of the unsaturates which are too light to retain in the final product.

Fig. 1 shows a flow-sheet for the Unitary Thermal process. The feed, consisting of stabilizer discard in liquid form, enters through line (1), and together with the recycle stock, flows to storage tank (2). Pump (3) delivers the liquid through feed exchanger (4), through the reaction coil (5) in the tube furnace, and into the fractionator (6).

In this fractionator all materials which are too light for use in the final product, including unconverted propane and butane, are taken overhead and delivered to the "gas recovery system", (7), which can be of any suitable type, such as an absorption or compression unit.

THE recovery system separates and discards to fuel all material lighter than ethylene, and makes two liquid products. One consists of unconverted propane and butane and the corresponding C_3 and C_4 unsaturates, while in the other are the heavier unsaturates which can be used in the final product. The first of these joins the incoming raw feed for recycling. The heavier product is fed to the primary fractionator below the feed tray where it mingles with the bottom product from the column.

The bottoms from the primary fractionator are fed to the gasoline fractionator (8), where materials within gasoline boiling range are taken overhead and condensed to make the final product. Heavy materials are withdrawn from the bottom of this column for use as gas-oil or fuel oil.

Fig. 2 shows one of the many possible modifications of the above system; in this case designed for making special products. Here the feed is put through a primary polymerizing step. Gases produced in this step are cracked, put through a second polymerization unit, and the products are finally fractionated and partially recycled through an absorption recovery system.

In Fig. 3 is a flow sheet of the Dubbs process plant of the Shamrock Oil and Gas Corp. Raw feed of fractionated butane first enters the storage tank (1) and is pumped by the feed pump (2) through the butane cracking furnace (3). Operating temperatures through the tubes of this furnace range from 1000° to 1150° F., with pressures ranging from 800 to 1000 pounds per square inch. The primary breaking down and partial re-combination steps occur in this furnace, the time element being provided by a large

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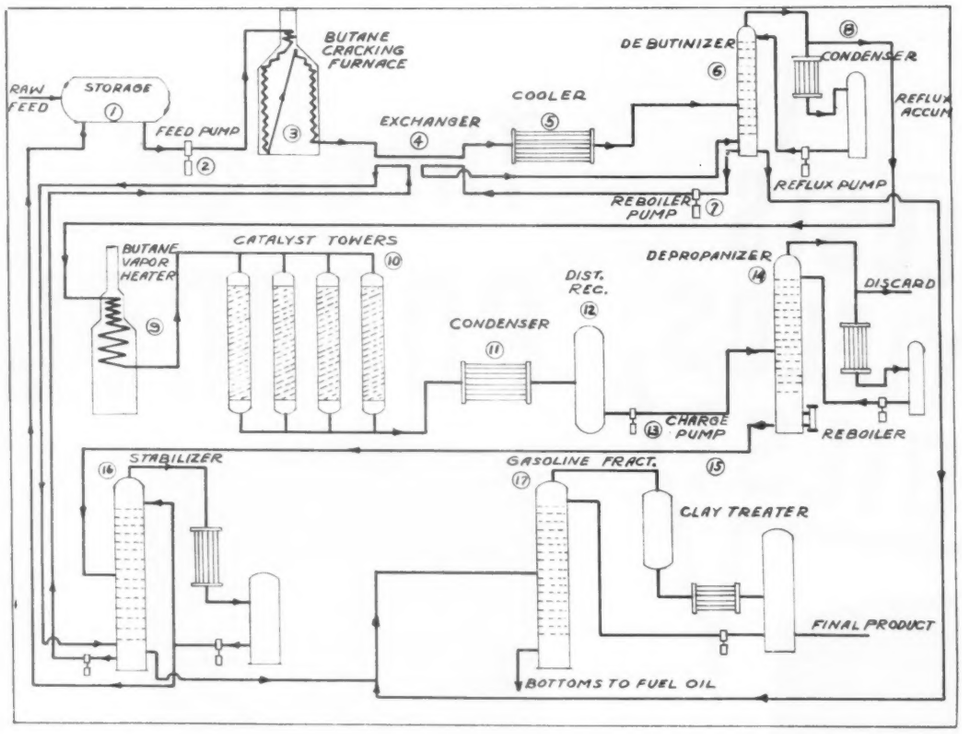

Fig. 2. The process of thermal polymerization has many modifications such as the one in this flow chart. It combines polymerization of unsaturated gases in a mixed gas, thermal decomposition, and polymerization of cracked material

group of tubes on the outlet side of the furnace. From the cracking furnace the material passes in vapor form through reboiler exchanger (4) to the vapor cooler (5), and thence to the debutanizer column (6).

In the debutanizer column the primary separation is made between heavy polymerized material formed in the cracking furnace and light materials which require further polymerization. Reboiler heat required for the operation of this column is secured by re-circulating liquid from the bottom of this column through a part of exchanger (4) and back into the bottom of the column by means of reboiler pump (7). The top temperature of the debutanizer column is controlled through a conventional reflux circuit, so as to take overhead only those materials which are too light to retain in the finished gasoline. This light material leaves the column through transfer line (8), which carries it to the strictly catalytic part of the system.

THE first step in the catalytic treatment of these vapors consists of heating them to a controlled temperaure. This is done in the butane vapor heater (9). The heated vapors then pass to the group of catalyst towers (10). These towers are arranged so that the vapors pass downwards through three of them in series, the fourth tower being available for regeneration while the other three are in operation. The piping and valves are so arranged that each tower in turn can be used for first admission of hot vapor. In this way operation of the towers can be rotated so that the tower containing the most highly spent catalyst can be taken out of service when the freshly regenerated tower is put into service.

From the catalyst towers the material, still in vapor form, passes through condenser (11) into distillate receiver (12). The liquid condensate is pumped by charge pump (13) into depropanizer column (14), where materials lighter than butane are separated from the product and are discarded. This column is refluxed in a conventional manner; reboiler heat is supplied by steam.

Bottoms from this column pass through pipe (15) to stabilizer column (16), where materials too light to retain in the finished gasoline are taken overhead and returned to storage tank (1) for recycling through the entire process.

Bottoms from stabilizer (16) and from debutanizer (6) run to gasoline fractionating column (17), where the materials which are too heavy for the final product are separated as bottoms. The finished product is taken over-head, condensed and run to storage.

The process of regenerating the catalyst towers consists of passing through them products of combustion from a gas fire under controlled conditions of temperature, pressure, and water vapor saturation. This requires an air compressor for the necessary supply of air, a small pressure retort in which combustion takes place, scrubbing equipment for removing carbon dioxide from products of combustion, and a small auxiliary air heating furnace for controlling temperature of the air passed to the catalyst towers.

The product from any of these processes must be treated for gum and color stability, and for sulfur if present. Vapor-phase clay treatment has been found satisfactory for gum and color stability. Sulfur can usually be controlled by a strong wash, or by several of the well-known standard sulfur treatments.

Yields

An analysis of yields for the Unitary Thermal process has been published*. Two cases are presented showing the results from feeding propane-butane mixtures. Table 1 is based on this data.

TABLE 1

	Charge			Raw	Finished		Yield	Yield
	Cubic	Pct. By		Yield	Yield	Yield	Pct.	Pct.
Comp.	Feet	Weight	Pounds	Gals.	Gals.	Pounds	Total	Butane
C_3H_8	31,000	56.6	3,600	....	....	....	....	....
C_4H_{10}	18,000	43.4	2,758	....	....	....	....	....
			6,358	480	408	2,460	38.7	89.3
C_3H_8	143,000	61.5	16,620	.....	.....	.....	....	.....
C_4H_{10}	68,000	38.5	10,410	.....	.....	.....	....	.....
			27,030	2,030	1,725	10,410	38.5	100.0

The above figures indicate a net yield of something like 35 to 40 per cent by weight of feed can be expected from a fairly representative feed stock taken from a natural gasoline stabilizer. They also indicate that some appreciable conversion of propane must occur in this process, since feed stock containing the larger percentage of propane shows larger percentage of yield, referred to the quantity of butane in the feed.

The Shamrock Dubbs plant is being operated on practically pure fractionated butane, substantially free of pro-

*Appr. 63.5° A. P. I., 500° E. P. raw poly liquid, losing appr. 15% in reducing E. P. to 440° and clay treating.

pane. Under the most favorable operating conditions yield of finished product is about 0.35 gallon per gallon of raw butane charged, indicating a recovery of about 45 per cent on a weight basis. Conversion of propane is felt to be so low by advocates of this process as not to warrant the additional plant capacity required to handle it.

Nature of Product

Table 2 presents in condensed form the principal properties of the product. Its chief value lies in the qualities of high octane value and high volatility. These properties make the poly product particularly interesting for the manufacture of aviation fuels. The blending value for raising the octane number of other types of gasolines depends, of course, on the nature of the base stock and on the blending ratio. In one case blending about 25 per cent by volume of poly liquid with a straight-run gasoline of 40 octane number, effective blending value runs from 105 to 110 octane number. In general, the higher the octane number of the base stock and the higher the percentage of poly liquid added, the smaller the effective octane number of the poly.

TABLE 2
Physical Properties of Typical Finished Poly Product

A. S. T. M. Dist.	
I. B. P.	99° F.
5%	118
10	124
20	135
30	146
40	158
50	174
60	192
70	214
80	251
90	316
95	374
E. P.	405
% Rec.	98%
Res.	1%
Loss	1%
Reid V. P., lbs.	9.2

General Qualities

1. **High Volatility**—40% over at 158°, against 20-25% for ordinary gasoline.
2. **High Octane Number**—80 to 85 on straight; blending value up to 110 depending on ratio and blending stock.
3. **Ease of Treating**—Vapor phase clay treats to 30 plus stable color and satisfactory gum (10 mgm/100 cc).
4. **Composition**—Predominantly paraffinic hydrocarbons from paraffin feed (propane and butane). Product averages 62 to 65° A. P. I. gravity.

Plant Investment

It is difficult to give anything but quite general figures on the total investment required for building a polymerization plant, on account of the large number of variables which may affect the cost of any particular project.

Assuming a supply of raw material is available for the feed, the cost of a Dubbs plant to handle 1000 barrels per day of raw feed will run around $300,000, exclusive of storage facilities for producing about 800 boiler h.p. of steam and for providing the compressed air required for the regeneration of the catalyst towers. The cost of a Polymerization Process Corp. plant will probably run about the same, although no definite figures are available covering such a plant to treat straight natural gasoline stabilizer discard.

The cost of the installation required to provide the feed stock will, of course, vary widely with plant conditions. It may be necessary to greatly increase the oil-circulating capacity of the gasoline plant in order to get the necessary extraction of butane or butane-propane. This may mean doubling gasoline plant facilities, or more. In any event, a considerable investment is necessary in equipment to capture and prepare liquid butane from the plant vent vapors. In the case of the Shamrock Dubbs plant built last winter, the cost of plant modifications required to provide a feed of 1000 barrels per day of fractionated butane was approximately equal to the cost of the polymerization unit itself.

The cost for larger units, will, of course, not go up in direct ratio with capacity—for example, a plant to handle 2000 barrels per day of raw feed would probably cost not over 150 per cent of the very rough figures given above.

Costs of Production

A cost analysis for operation of the Unitary Thermal process is presented in Table 3. The figures for direct operating costs are based on a similar analysis by Keith and Ward.‡ Their figures are for a plant producing 2100 barrels per day of product, operating on refinery gas containing 22.3 per cent of unsaturates. Figures for the 1000-barrel plant are based on the assumption that most items of operating cost, also the plant investment, would be about two-thirds of the figures for the larger plant.

In this analysis of costs there are two items which may be open to question. The first is the value of one cent per gallon placed on the charging stock. It is felt that this is a reasonable and conservative value based on average operating conditions; however, if there is any market for the butane or propane-butane mixture as such, this value would be in most cases much too low.

The second item which may be open to question is the rather high charge of 20 per cent for obsolescence and depreciation. It is felt that, in the present state of the art, this rate is justified for two reasons. In the first place, a good deal of equipment is required to operate under rather extreme conditions of pressure and temperature, which lead to rapid deterioration. Secondly, it is felt that future developments are likely to make plants, built according to present ideas, obsolete to a greater or less degree in a comparatively short time.

As shown by the final figures in Table 3, assuming the

‡Oil & Gas Journal, Nov. 28, 1935.

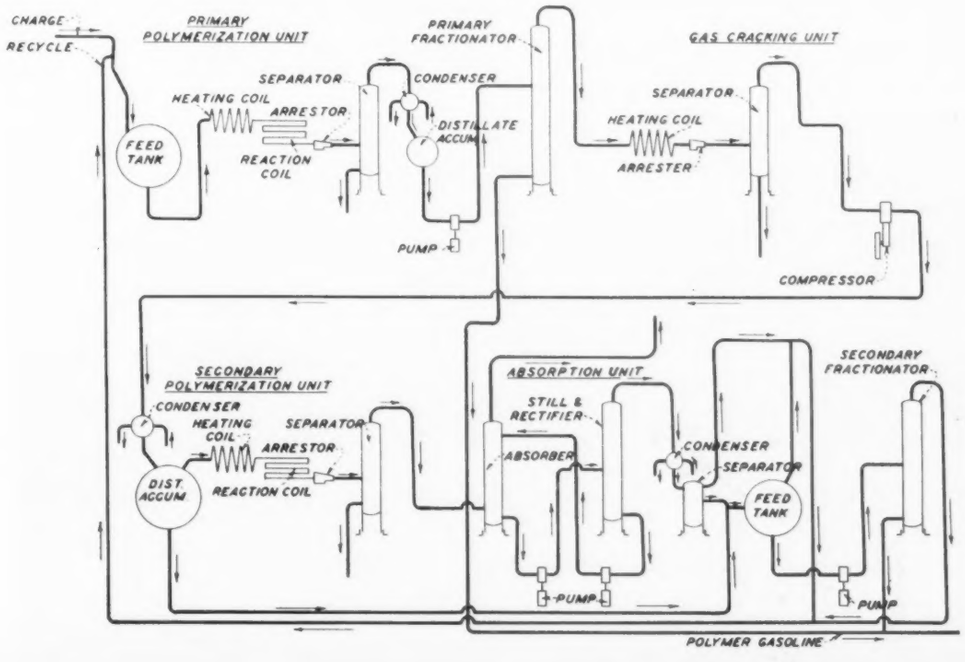

Fig. 3. Flow chart of the only commercial application of the catalytic polymerization process

TABLE 3

	Daily Propane-Butane Feed 319,200 gals. Daily Production 2100 bbls.	152,000 gals. 1000 bbls. (Est.)
DIRECT OPERATING COST per calendar day		
Operating labor	$ 80	$ 80
Operating supplies	5	5
Maintenance (@ 4% annum on investment)	137	93
Fuel, @ 80c bbl.	243	162
Steam @ 30c / 1000 lb.	23	16
Power @ ¾c / KWH	412	274
Water, @ 1c / 1000 gals.	117	78
General Expense	30	20
Total Operating Cost / Day	$1047	$ 728
Debit:		
Net Charge, on basis 37% net yield by weight, evaluating liquified propane-butane charge at 1c / gal. fuel value and cost of preparing	$3192	$1520
Direct Operating Cost, as above	1047	728
Fixed Charges, basis—Interest 5%		
Obsolescence and Depreciation 20%		
Taxes and Insurance 2%		
Total fixed Charges 27%		
2100 Bbl. Plant Investment, $1,250,000	925	
1000 Bbl. Plant Investment, 833,000		616
Total debits	$5164	$2864
Credit:		
Gas Oil produced 232 bbls. @ $1.30	301	
110 bbls. @ 1.30		144
Net Total Cost per Day	$4863	$2720
Net Cost / gal. of Poly gasoline	5.51c	6.48c

reasonable accuracy of the detail costs presented the net cost at the plant of the finished poly gasoline is about 5½ cents per gallon for a plant producing around 2000 barrels per day, and about 6½ cents per gallon for a plant producing 1000 barrels per day. These plants would require a raw feed of about 320,000 gallons per day and 152,000 gallons per day, respectively.

It should be noted that the figures presented are based on the straight thermal process, where mixtures of propane and butane similar to those presented in Table 1 are charged to the unit. If substantially pure fractionated butane is charged, as in the Dubbs process, the amount of butane must be increased increasingly to produce the same total final yields. It has been shown that the yield from typical butane-propane mixtures is about 37 per cent by weight, whereas the yield from straight butane feed through the Dubbs process is about 45 per cent by weight. This would mean that for an equal yield of final product, the total weight of straight butane charged to the Dubbs process would be only about 82 per cent of the total weight of butane-propane mixture required for the thermal process. However, the amount of butane itself required for the Dubbs process feed would be just about double the amount of butane required in the mixture feed to the thermal process, for the same total amount of final product.

The question of whether or not a polymerization unit will pay is purely a question of determining whether the value of material produced at the time and place under consideration exceeds the approximate cost as indicated by figures in Table 3.

Considering the poly product itself for use straight as motor fuel, there are probably very few locations at present where a profit could be shown in competition with other methods of producing motor fuel. However, there may obviously be cases where the value of the poly product for blending purposes may be much greater than its value if used straight for motor fuel. The question must, of course, be worked out on the merits of each individual case.

In the case of the Shamrock-Dubbs unit, the owner company had an oil refinery which produced gasoline of exceptionally low octane number, making a base blending stock which could use the peculiar properties of the poly product to greatest advantage. In spite of the fact that the value of the finished motor gasoline at the refinery was in the neighborhood of 4½ cents, the value assignable to improvement of octane number of the finished product obtained through the use of poly gasoline indicates a very satisfactory profit on operation of the poly unit.

References

The following list of references covers some of the later articles which have appeared in publications regarding polymerization. As mentioned in the references, several of them, themselves, carry more or less complete bibliographies, particularly the third reference under the general heading of "Process", which carries 145 references.

Process

Unitary Thermal Polymerization Process—J. S. Carey—Refiner & Natural Gasoline Manufacturer—Dec., 1936. (Full discussion of process and chemistry.)

Motor Fuels of High Octane—Blending Value Produced By Thermal Process—P. C. Keithe, Jr. and J. T. Ward—Oil & Gas Journal, Nov. 28, 1935. (Discussion of process and economics. Contains a very complete bibliography of 145 references.)

Polymerization a Major Factor in Tomorrow's Super-Fuels—Gustav Egloff, National Petroleum News, Oct. 14, 1936. (Describes Dubbs Catalytic Process, discusses chemistry—3 References).

Chemistry

Motor Fuel Isoparaffins by Thermal Gas Polymerization—F. E. Frey—CNGA—1936. (Discussion of experiments and chemistry.)

Industrial and Engineering Chemistry, Frey and Hepp, V-28, p. 1439 (1936).

Products of Polymerization—C. M. Ridgway, C. M. Wagner, H. R. Swanson, National Petroleum News, Nov. 4, 1936. (Discussion of thermal process modied for special products—5 references.)

Reactions of Pure Hydrocarbons, by Gustav Egloff, Reinholdt Publishing Corp., 330 W. 42nd St., New York (1937).

Note

Discussion of this article which took place at the California Natural Gasoline Association meeting was published in NATIONAL PETROLEUM NEWS Nov. 24, 1937, p. 36.—Editor

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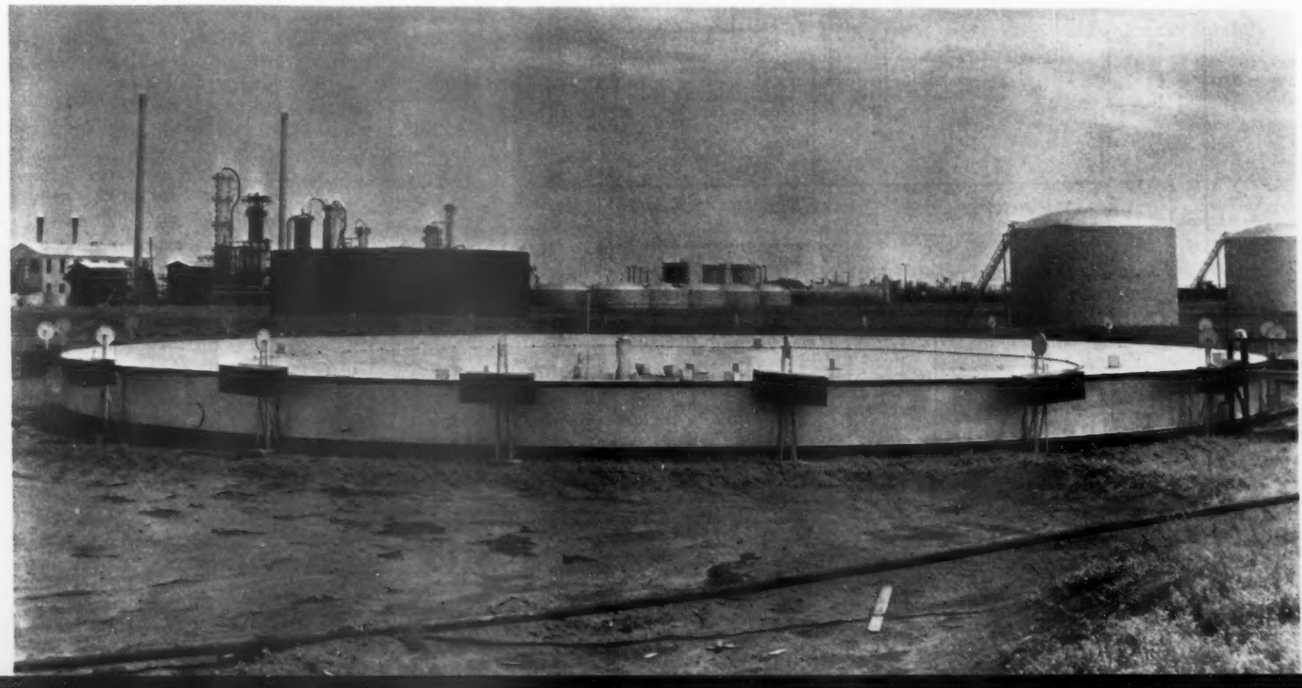
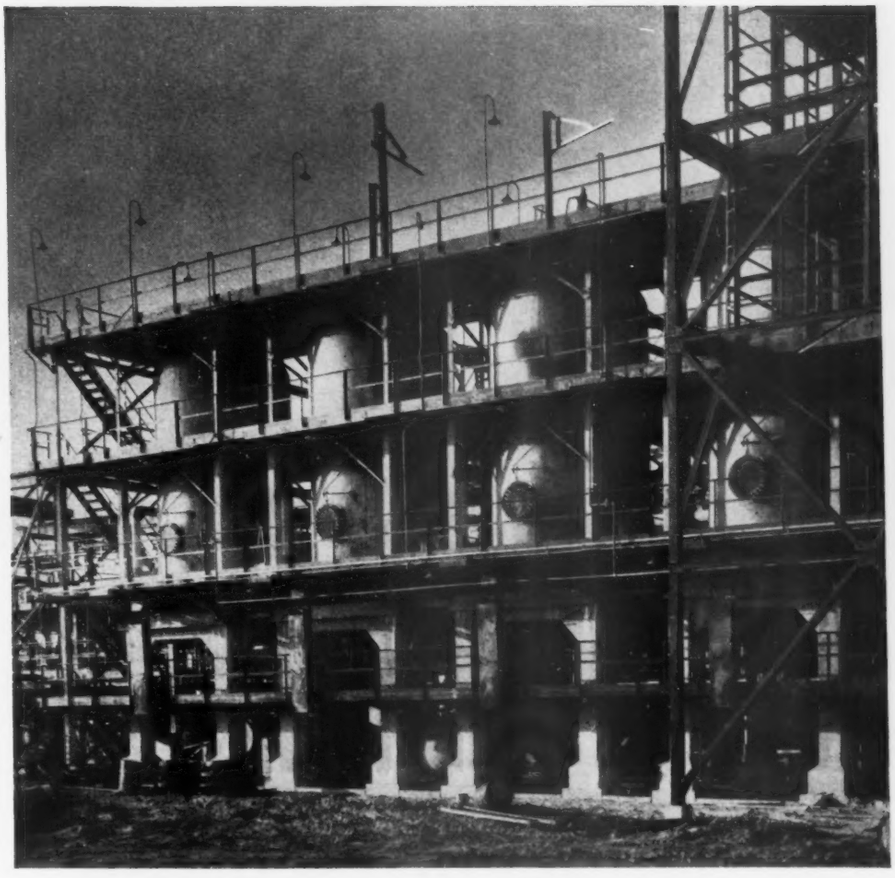
The Globe Oil & Refining Co. has had this Wiggins Balloon in service at its McPherson, Kans., refinery to save evaporation losses since 1933. A double deck type, it is 128 feet in diameter and has a capacity of 100,000 cubic feet. It serves 14 tanks. Vapor spaces of the tanks are connected by runs of light weight pipe ranging from 8 to 12 inches in diameter. This piping is mounted on supports a short distance above the ground.





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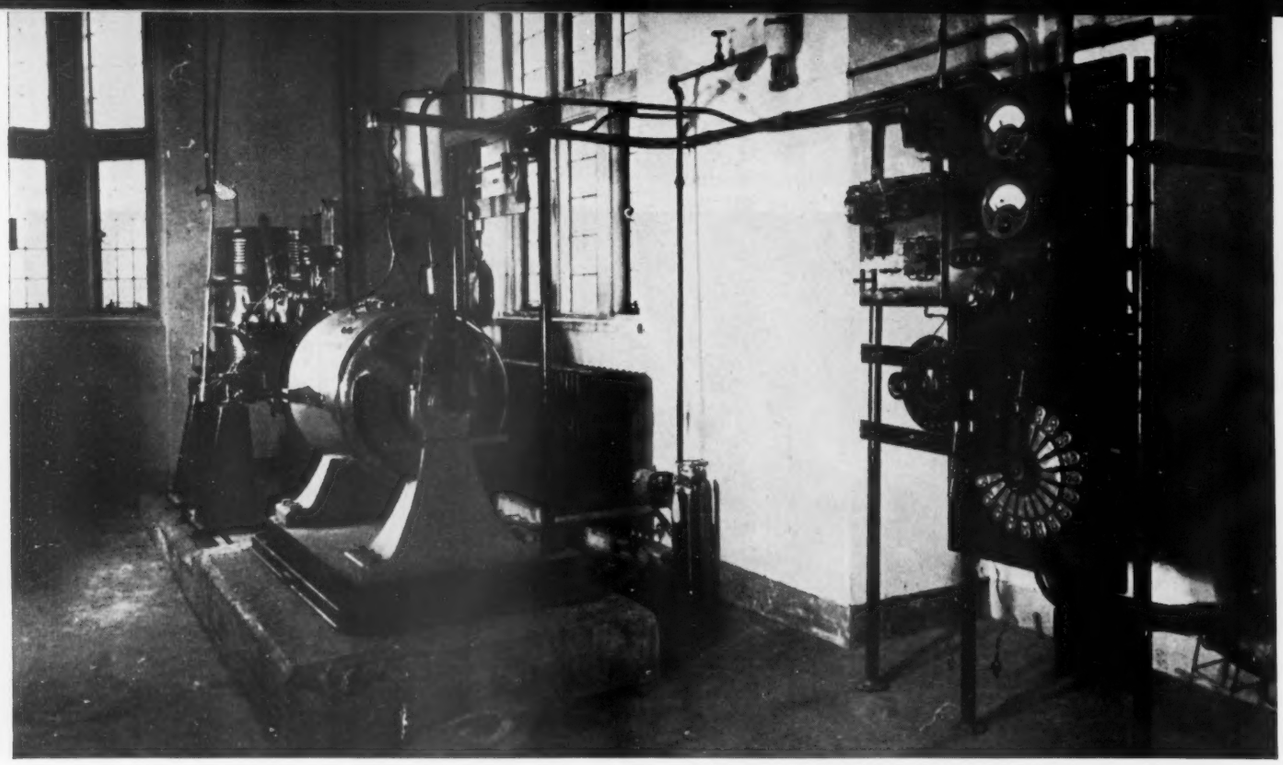


Dynamometer-engine assembly used for testing lubricating oils, fuels, etc., in the University of Tulsa engineering laboratories

832
265

Qualities of Lubricants From Mid-Continent Sources

By Dr. SIDNEY BORN*

● Two lubricating oils made from widely differing sources and showing Conradson Carbon Residues of 0.38% and 0.65% showed consumptions of 1681 cc. and 1984 cc., respectively under identical test conditions in a truck motor attached to a dynamometer. The carbon deposits showed practically the same ratios as the Conradson Carbon values in these tests.

VERY frequently I am asked the question: "What kind of oil shall I use for my car?" The average motor car owner has an investment ranging from seven hundred dollars to three thousand dollars in his automobile, and while he realizes the importance of proper lubrication he is often confused and bewildered at the conflicting claims and statements that glare at him from billboards and the pages of newspapers and magazines.

Before the development of the present day refining methods, certain oils which required a minimum of refining were recognized for their quality and uniformity. Technological progress in refining processes has so altered this picture that lubricants are now being manufactured from crude oils which were previously considered unsatisfactory as a source of lubricating oils. At the present time more than ever before it is impossible to evaluate the quality of a motor oil from knowledge of its source or processes used in the manufacture of it. The question thus confronts the motorist: "Is the oil at this filling station suitable for use in my car?" The suitability of an oil as a lubricant for an automotive engine can be judged in four respects:

1—Does it protect and preserve the moving surfaces by the formation of an oil film? Obviously this is the most important requirement of a lubricating oil.

2—Is the oil chemically stable? Carbon deposits or the formation of tardy sludge-like materials are indications of instability.

3—How much oil is consumed by the engine? The oil consumption appears to be related to the volatility of the oil, but only in a general way.

4—How does the oil affect friction? The ability of the oil to serve as a lubricant may be measured by the fuel consumption, the friction test and by the power output of the engine.

Considerable difference of opinion exists as to the relative merits of lubricating oils manufactured from crude oils produced in different parts of the United States. In this article we will review some of the data available on this subject and will also present the results of some experimental work we have carried out in our laboratory.

Wilson and Keith (1) have pointed out that four of the most important properties of motor oils are as follows:

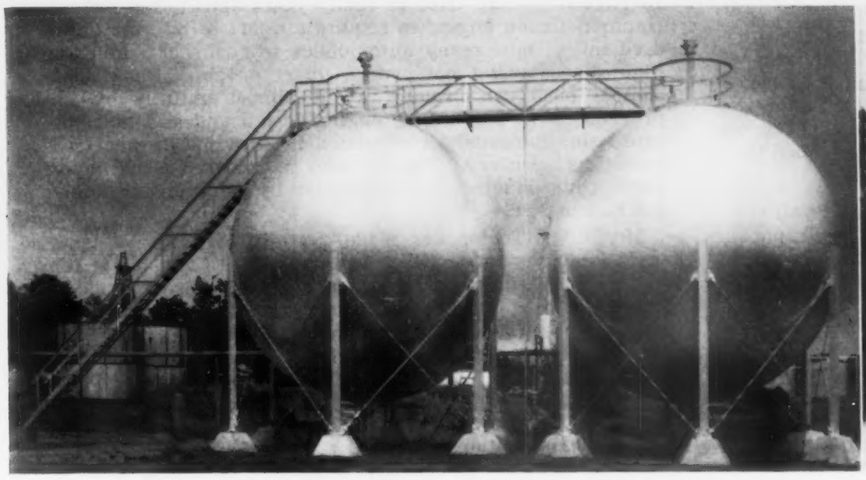
1—Low carbon forming tendencies.
2—Low pourpoint.
3—High viscosity index.
4—Resistance to oxidation.

They also point out that if any attempt is made to evaluate the relative practical importance of the four above mentioned properties, serious disagreement is encountered.

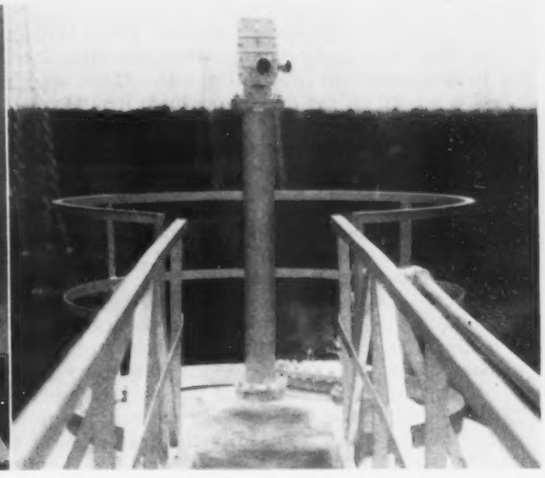
They state: "This is due partly to the fact that the relative importance of the different properties varies with

*Professor of Petroleum Research, Univ. of Tulsa.

Lisbon Gasoline Co., uses S & J Automatic Tank Gauges



Two 1500 barrel Hortonspheres of the Lisbon Gasoline Company, Turnertown, Texas, designed to operate at an internal pressure of 60 pounds per square inch



View of one of the two S. & J. Automatic Tank Gauges installed on the Hortonspheres at the left

AN automatic gauge on any storage tank is as handy as a pocket in a shirt, but on pressure storage it represents the only practical method of measurement.

The two Hortonspheres of the Lisbon Gasoline Company of Turnertown, Texas, used for the storage of butane, are equipped with S. & J. model ST 557 Automatic Tank Gauges especially designed for tanks operating at pressures up to 125 pounds.

When you plan new storage, you will naturally consider spherical and spheroidal tanks and you can turn confidently to S. & J. for a complete line of fittings which includes Still Type Breather Valves, Flame Arresters, Automatic Tank Gauges, Locking Type Gauge Hole Covers, Instrument Lock for Sampling and Temperature Recording.

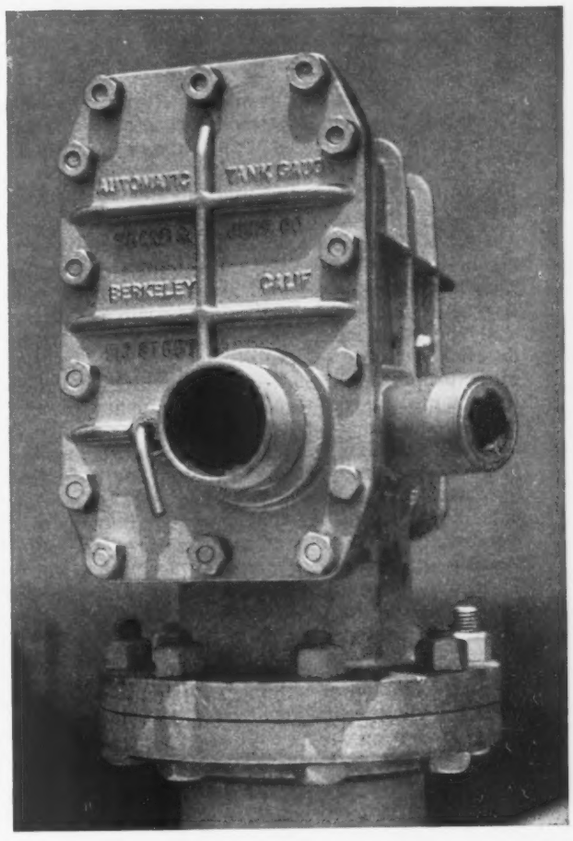


Figure ST 557 High Pressure Automatic Tank Gauge designed for measuring the contents of tanks in which the pressure will not permit manual gauging. Suitable for spherical tanks or underground storage with the reading glass always at average eye level

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the season and with the engine, but probably more to the fact that refiners who make their motor oils from Coastal and California crudes have long emphasized the properties of low pourpoint and low carbon-forming tendencies in which their product has always excelled, whereas Pennsylvania refiners have emphasized low consumption, easy starting and stability in service, which we now know are largely determined by the second two properties of viscosity-index and resistance to oxidation. Refiners of Mid-Continent crude have tended to emphasize balanced quality, since their oils have been reasonably good in all four respects, though generally not up to the maximum in any single property."

The last paragraph quoted from Wilson and Keith's article very aptly summarizes the situation with respect to Mid-Continent lubricating oils. If we take into consideration all the different factors which insure good performance, the oils manufactured from Mid-Continent type crude oil have certain well balanced qualities which assure good performance to the motorist.

Our investigations have shown that practically all well refined hydrocarbon oils, irrespective of their geographical origin, will protect and preserve the moving surfaces of an automobile engine provided that an oil with the proper viscosity is used. Several years ago E. W. Upham, chief metallurgist of the Chrysler Corporation, presented a paper before the A.S.T.M. entitled "Viscosity of Automobile Crankcase Oil as Related to Service Requirements" (2). Upham stressed the vital nature of viscosity in lubrication and considered that the three basic viscosity requirements for a lubricating oil to be used in the crankcase of an automobile are as follows:

1—"Viscosity limitations must be such as to insure starting of the engine in cold weather.
2—Viscosity limitations must be such as to prevent excessive oil consumption.
3—Viscosity limitations must be such as to secure fluid film lubrication."

Undue stress has been laid in many cases on requirement No. 1 which is often interpreted as being correlated with the viscosity index. In a paper published September 25, 1934 (3), Hans Vogel discussed the question of lubricants for automobile and airplane engines and reported as follows:

"It is generally held that oils with flat viscosity curves are better lubricants than those with steep viscosity curves. This is not always correct and requirements relative to the degree of flatness of the curve should not be exaggerated. The operating safety of an automobile or airplane engine depends not only on the viscosity curve but in addition on other properties discussed below which may be even more important. In recent years the tendency in selecting automotive lubricants in America has been in the direction of low-viscosity oils. The fear of injuring bearings by using thin-oils has been somewhat dissipated by the statement made by a well-known engineer of the Packard Motor Car Company at a meeting of the American Petroleum Institute in October, 1933. The statement was to the effect that no bearing injury ever occurred on account of too thin an oil. Thin oils offer the advantages of higher efficiency and better cooling of the bearings. Their disadvantage is a higher oil consumption.

When discussing the question of viscosity of oils for internal combustion engines, it should always be kept in mind that the engine never contains the oil in its pure state, but always a mixture of oil and fuel residues. Even at the end of a few hundred kilometers, especially with water cooled engines operating in winter time, a considerable amount of low boiling fuel residues can be found in the oil."

The improved fuels used at present and crankcase ventilation have reduced crankcase dilution somewhat. Nevertheless, the effects of dilution combined with the use of low viscosity oils, the effect of viscosity changes in use, and the effect of relatively small differences in viscosity indices between oils derived from Mid-Continent crudes and very high viscosity index oils, explain from a practical standpoint why automobile engines operated even in extremely cold climates have just as great ease of starting with one type oil as the other, provided that the viscosity of the oil is properly selected for the automobile engine. For some years manufacturers of oils with high viscosity index laid great stress upon this point and the flatness of their viscosity curves but these claims have not been substantiated by actual performance data.

The question of oil consumption is a very important one in the motorist's mind, although many automotive engineers assert oil consumption within reasonable limits is a good investment in lubricating benefits and in decreased fuel consumption. Not so many years ago it was not uncommon for an engine to require a quart of oil every hundred miles; now many automobiles will run 2000 miles at high speeds using not over a quart or two of oil. This change has been brought about almost entirely by improvements in automotive engine design and assembly, because simultaneously a reduction in oil viscosity specifications has occurred. Rarely does a motorist bring upon himself high engine oil consumption by using oil of too low S.A.E. number.

Mr. M. O. Teetor has made a study of "The Influence of Engine Design on Oil Consumption" (4) and has given a very good summary of the mechanical causes that contribute to oil consumption and oil leakage in an automobile engine. He states: "The oil in an automobile engine has three ways to escape. It can leak out where shafts project through the crankcase or because of faulty gaskets or packing; it can be drawn into the combustion chambers past the intake valve guides; or it can pass the pistons into the combustion chamber.

The amount of oil that leaks out of automobiles is tremendous. This is clearly demonstrated by the discoloration of our concrete highways. Main bearings that do not provide for some type of efficient drainage back into the oil pan allow the oil to follow the crankshaft to the outside of the crankcase. The problem of holding oil in a crankcase is not simple but it can be solved—for some engines do not leak oil. The best of gaskets can leak oil because of faulty installation, but when they are properly designed and installed they usually do not leak.

If the correct amount of oil is delivered to the valve alley, the vacuum in the intake manifold will deliver the oil to the valve stems for sufficient lubrication. Whether the valves stick, wear excessively or allow too much oil to escape into the combustion chamber depends upon the design and fittings of the valve guides and stems. Some designs give good service and do not consume excessive amounts of oil which is sufficient proof that this problem is not too difficult.

Although it is recognized that oil can leak out of the crankcase, and that it does pass the intake valve guides, the most attention given the subject of oil consumption has been centered on the amount of oil passing the pistons into the combustion chamber. Oil lost on the road does not cause trouble. It just costs money. Oil that passes the intake valve guides causes little or no trouble but costs money. Excessive amounts of oil passing the pistons causes trouble and is expensive in terms of oil, maintenance and the life of the engine."

There is some difference of opinion as to the effect of volatility of oil used on oil consumption. W. H. Graves, in a paper presented before the March 8, 1933, meeting of the A. S. T. M. (5), concluded that oil consumption increases with volatile oils only to a slight extent and is unimportant by comparison with other factors. They report the following results:

	Oil No. 1	Oil No. 2	Oil No. 3
S. U. V. at 100° F.	1310	1360	2760
S. U. V. at 212° F.	105	104	103
Carbon Residue	1.00	0.15	0.70
Viscosity Index	99	95	3
% Distilled at Cranking Temperature at 10 mm. pressure	30	30	90
Consumption—Miles per Gallon	94.6	110.5	96.5

Oil No. 1, apparently is a Pennsylvania type oil while Oil No. 3 is of Coastal origin, yet the oil consumption is approximately the same for oils 1 and 3.

On the other hand, Davis and Best (6), claim that oils

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having a high volatility will cause a greater consumption than oil having a lower volatility. This was shown by a number of tests carried out by Davis and Best who prepared a series of oils by blending neutrals of different boiling range with a base bright stock to an oil having a viscosity of 235 at 130°F. As all the oils had the same viscosity the only variant was the volatility. Their tests carried out both in laboratory engine tests and in motor cars, showed that oils with high volatility showed greater oil consumption than oils with low volatility.

Another factor causing high oil consumption is chemical instability of the oil. Oils which are unstable and which show high carbon deposits invariably use more oil than those with lower carbon deposits. This was shown graphically in a series of tests in our laboratory.

Both of the oils tested were run for 40 hours under identical conditions in a Ford V-8 truck motor connected to a 75 h.p. Sprague electric dynamometer.

	Oil No. 1	Oil No. 2
Conradson Carbon	.38%	.65%
Carbon Deposit in Engine ..	16.91 grams	28.83 grams
Oil consumed in run	1681 c.c.	1984 c.c.

These results indicate that the oil which showed higher carbon deposit also showed the higher oil consumption.

Even if an oil has a low viscosity index (a steep viscosity temperature curve) as soon as it has been used the viscosity index increases. These changes were also noted by M. A. Dietrich, in a study of "Service Changes in Crankcase Lubricating Oils," (7), who stated that: "Used crankcase oils generally show a markd decrease in viscosity, flash and fire points, and pour point because of dilution. A decided increase is noted in the carbon residue and ease of emulsification with water. The extent of change which these characteristics undergo bears no relation to the original characteristics of the oil. The presence of dilution appears to reduce the slope of the viscosity temperature curves for those oils whose viscosity temperature curves are steep."

Ring-sticking tests indicate that Mid-Continent oils are equal to if not superior to high viscosity index Eastern oils. Lederer and Zublin (8) state that: "Dependable test data indicate that there are strong probabilities that the oils made from Mid-Continent crude have better resistance and longer lasting qualities than other paraffin oils."

Although physical tests of lubricating oils may be useful from a general standpoint, final judgment must be based on performance in service. This is particularly true of oils which one or two types of laboratory tests indicate are superior oils, and of oils containing addition agents. This is a result of the limitations of the physical tests themselves, the variations in relative importance of oil characteristics under the wide range of crankcase conditions encountered and from the changes which occur in oil during use. Clower and Connor have concluded from engine tests (9): "It appears that the importance of the properties of new oils, as measured by laboratory tests, has been overemphasized, because oils in service only retain their original properties for a comparatively short period of time."

Born and Harper (10), carried out a series of tests to establish a relationship between physical tests of various types of lubricating oils and engine performance. All of the oils tested were found to be satisfactory as lubricants for the engines under the test conditions. Of the small differences which appeared in the engine tests, the oils from Mid-Continent crudes showed lower carbon deposits and lower fuel and oil consumption than the others which included a Pennsylvania oil. They have concluded: "The service performance of an oil is greatly dependent on unavoidable differences in engine conditions and the performance cannot be accurately judged by the properties of the lubricating oil."

A satisfactory lubricant results from having both a good crude oil and a refining method adapted to the crude processed. Mid-Continent lubricating oils have adequately proven themselves in service performance in millions of cars, trucks and tractors over a long period of years under all types and conditions of operation, which is the best criterion by which an oil can be evaluated.

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New Era Opens for Steel

PHILADELPHIA, Nov. 29.—A new era in the manufacture and use of steel is being entered in which the metal will be 'tailor-made" for a wide variety of uses, Dr. John Johnston, director of research of U. S. Steel Corp., said at a meeting of The Franklin Institute here recently.

An outstanding reason is that the atomic behavior of iron on heat treatment is being better understood and put to practical application, he said. Significant is the better knowledge of the two crystal forms of iron and the transformation from one form to the other in which carbon is precipitated. The mode of distribution of carbon is fixed by precise temperature which can now be controlled to enable modification of the internal structure of metal at will.

Heat Exchanger Standards

NEW YORK, Nov. 29. — The Heat Exchange Institute has published a Standards of the Tubular Exchanger Section covering mechanical, construction and thermal standards for shell and bare tube heat exchangers. The standards contain data on exchanger shells, tube sheets, baffles, support plates, tubes, material specifications, fouling factors and thermal design data.

Copies may be secured from C. H. Rohrbach, secretary, 90 West St., New York, at 75 cents.

Offers Instruction in Geophysics

STATE COLLEGE, Pa., Nov. 29. — Correspondence in geophysical prospecting is being offered for the first time this fall by the School of Mineral Industries here at State College. It will cover the lecture part of work given in residence. Text material has been newly compiled by Dr. H. Landsberg, assistant professor of geophysics. It gives on 61 mimeographed pages, with 41 illustrations, the most important phases of the new science.

Training in Technical Writing

Instruction for technical men in writing for publication is offered by the University of Wisconsin, Madison, as a home study course available to individuals anywhere. The course is offered by the Extension Division and also includes helps in writing business letters and reports.

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Patent Literature

In Refining Technology—VII

A2. Synthetic Lubricants

Additives of Mineraloid Character

By J. H. BYERS

Abstract

● Synthetic additives are considered those artificially produced materials possessing properties comparable to, and composition similar to natural hydrocarbon lubricant constituents.

These products are used to improve properties of pour point, viscosity, stability, color, oiliness, and/or to add to the oil properties damaged or lessened by refining processes.

This article is the second in the three-article series on these types of lubricants, the first appearing in our Oct. 6, 1937 issue. The third will appear in an early issue.

PATENTS constitute the record of an experimental department of technology, sometimes referred to as "invention". They disclose the "state of the art" in many branches, frequently giving information that can be secured nowhere else; and they indicate what tomorrow's state of the art may be. Not that any predictions regarding pending commercial developments are infallible, but patents are straws that show which way the wind blows. We believe that some who have been forecasting dismal things for synthetic lubricants, have not seen the patents. When a dozen oil companies put down a patent barrage the size of this one, a suspicion arises that the importance of synthetic lubricants has been underestimated.

Just what is a synthetic lubricant? Within the term many compounds might be grouped. In fact, there is almost no end to the different substances that could be so designated. Any compound, composition or mixture, made artificially and used for lubrication purposes can properly be called a synthetic lubricant. But in the literature of lubrication the term has acquired a limited significance. It denotes oils or substances having oil-like properties, or having lubricating, or lubricant improving qualities, produced by condensation and/or polymerization. It defines a field of activity which might be described as the production of mineral oil substitutes. For present purposes, we may define a synthetic lubricant as a substance which is produced synthetically, which resembles known lubricants in chemical structure and properties, and which is capable of being used to supplant wholly, or supplement in part, existing lubricating oils. This definition marks out a coherent field of patent activity.

With respect to the use of synthetic oils as mineral oil substitutes, there is a considerable "art" on the subject, and this will be covered in an ensuing digest. How rapidly strides will be made in the direction of straight synthetic lubricants, is a matter of some speculation. The cost will be a determining factor, and before synthetic lubricants can compete, either they will have to cost less, or mineral oils will have to cost more. On the other hand, in countries currently faced with conservation problems, investigations of synthetic oils are deemed a subject of national importance. Great Britain and Germany are interested in the possibilities of synthetic oils as means of combatting petroleum shortage, and it is reported that Germany has commercially practiced the so-called Voltol process, which is a step in the direction of synthetic lubricants, for a considerable time.

But if replacement of pure mineral oils by straight synthetic oils is not an immediate prospect in this country, the use of synthetic additives is a commercial reality. Partly for this reason, the subject of synthetic lubricants has been here broken down into sections dealing, first, with additives, and second, with straight lubes. The field covered by the patents falls naturally into these two main subdivisions. The additives themselves are varied and numerous enough to merit a further subdivision into, first, the less petroleum-like synthetics, and second, those definitely of mineraloid type. The first class was covered in a prior digest in the NATIONAL PETROLEUM NEWS of Oct. 6, 1937, page R-218, the second is the subject of the present digest.

The question arises: why additives? Broadly, there are two reasons, expanding lubrication demands, and improved refining processes. New type gears and bearings, faster speed and higher powered engines, to enumerate examples in the automotive field alone, suggest why the old mineral oils need bolstering. And, too, there is the effect of refining methods. In the separation of petroleum oil into its constituents and decomposition products, groups of inseparable compounds with various properties are eliminated, not only the undesirable, but sometimes, unavoidably, the beneficial. For example, in the separation of wax associated constituents which have oiliness, often are taken out. In other refining operations, natural inhibitors, and desirable color bodies are removed. It therefore becomes necessary to put back into the oil the quali-

ties thus lost. This may be done by the use of additives. It is then, in all probability, the increased efficiency of refinement that is partly responsible for the growing use of additives.

The problem suggests the solution. True, we can add fatty acids, chlorine, sulfur or complex organic compounds, but since it is a mineral substance we are taking out, should it not be a similar substance we put back? In some of the ensuing patents this is the fundamental idea. Or if for any reason it is inexpedient or impossible to isolate and recover the desired constituents, why not make substitutes — synthetic substances which resemble, or have the properties of, the missing components?

Moreover, there is a not unfounded belief that foreign substances are to be avoided. Chlorine compounds, fatty acids, and other nonhydrocarbon substances have the obnoxious faculty of breaking down into hydrochloric acid and other corrosive compounds, with unfortunate effects on bearing metals. Other things being equal, the more closely an additive compound approaches mineral oil in its characteristics, the more it is to be desired. Pour point inhibitors are a familiar example. Prior to patent No. 1,815,022, pour point inhibitors were not in favor. They consisted of such substances as soap, and chloroform, which were in some instances unstable and in others corrosive. When Paraflow was brought out under the patent, emphasis was laid on the fact that here was a "pure hydrocarbon lubricating oil" (see article by Davis and Blackwood, Ind. Eng. Chem., Dec. 1931, p. 1455) or, quoting from a pamphlet issued by the Standard Oil Development Co., "A specially processed hydrocarbon oil—quite ordinary in appearance, resembling Pennsylvania or Oklahoma bright stock — but quite extraordinary in its effect on oils with which it is blended, reducing their pour points to a remarkable degree without impairing lubricating value or otherwise changing their properties." This business of getting into an oil the properties it needs without altering its mineraloid character reaches its climax in synthetic lubricants, which are close copies of mineral oils, in appearance, constitution, and properties.

Among the purposes for which mineraloid synthetic oils are mixed with natural lubricating oils are pour point, viscosity, stability and color improvement. Film strength seems to be bettered in one instance. Two early patents, issued to Heitmann, refer to the employment of polymerized oils as emulsifying aids. Patent 1,593,762 describes the exposure of lubricating oils to the action of electric discharges, whereby "Voltol" was produced, an oil capable of being directly emulsified with water, no additional emulsifying agent being necessary. In patent No. 1,632,027, Heitmann describes the use of this same Voltol as an emulsifying agent for grease, either alone or joined with other agents.

The use of synthetic substances resembling mineral oils to lower pour point was introduced by Davis, Pat. No. 1,815,022. We have discussed this previously. The Maverick patent, 1,963,239 likewise was noted in the digest of pour inhibitors, (NAT. PET. NEWS, Dec. 2, 1936, p. 83). MacLaren, 1,963,917 and 1,963,918 gives other examples of condensation products which basically, are combinations of paraffinic and aromatic radicals. Osterstrom, 1,973,824 represents a somewhat different type, namely, a hydrocarbon produced by aluminum chloride treatment of cracking residues.

Shaffer and Fasce, 1,988,753 suggest aluminum chloride treatment of anthracene in Edeleanu extract. Moser, 2,010,606 and 2,080,088 describes pour inhibitors obtained by polymerization of Edeleanu extract. Frolich 2,015,748, MacLaren 2,030,307, Winning and Young 2,045,742, Sloane 2,045,806, Gleason 2,049,058, MacLaren and Stockdale 2,057,104, all describe improvements on the paraffin — aromatic type of inhibitor.

Davis, 2,062,354, as well as Winning and Young, 2,045,742, proposes to condense halogenated paraffin wax in the absence of cyclics, the product having pour inhibiting properties. Towne 2,064,506, uses for pour point and other purposes, polymers prepared from hydrocarbon gases. Rosen 2,069,273, may or may not use cyclics. Davis and Swoope claim an improved process of producing the Paraflow type of agent.

Fluorescence is the object of a number of patents. In the production of lubricating oils the refining frequently removes desirable color characteristics. As the oils are passed through fuller's earth highly colored material is received on the filter. This material may be washed from the fuller's earth by means of naphtha. According to Miller, 1,869,608, the naphtha dissolves, among other materials, asphaltic-like bodies which, it is probable, are polymerization products. These polymers can be added to any oil which is below standard, in order to impart color and bloom. The idea of dyeing or coloring oils is extended by Shaffer and Fasce, Pat. No. 1,988,753. These patentees prepare a dye stock from by-products. A sulfur dioxide extract, together with anthracene, is refluxed with aluminum chloride. From this treatment a product is obtained which is distilled. The distillates have dyeing properties, and the residue, a solid black resonous material, also is useful in this connection.

The Moser patent, 2,010,606, is directed to polymerized SO_2 extracts, the polymerization being effected with or without a catalyst. Aliphatic radicals are introduced by Rabe, 2,028,472, an olefin or a halogenated paraffin wax being reacted with a polynuclear aromatic hydrocarbon. Similar fluorescent materials are described in Pat. No. 2,071,521 by Hartmann and Rabe.

Film strength is a prerequisite of the lubricating oils specified by Lincoln and Henriksen 1,945,615. In outline, hydrocarbon wax is chlorinated then condensed by means of sodium ethoxide. It is stated that the product, if added to lubricating oils improves the film strength. On the Timken machine, the original hydrocarbon lubricant carried 10,500 pounds per square inch. One per cent condensation product boosted this figure to 13,500. In the claims it is stated that the condensation product contained a small amount of chlorine in combination.

A synthetic product which shows good thickening powers and has a marked effect on the viscosity index, when added to lubricating oils in proportion of 5%, is

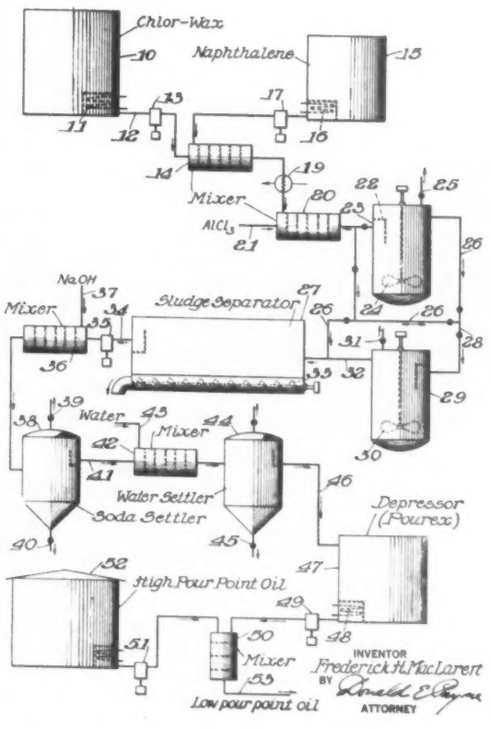

Fig. 1. Flow sheet showing system for the production of "Pourex." (MacLaren, Pat. No. 1,963,918)

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described by Fulton and Mikeska, 2,072,107. This product is a rubbery plastic resin, somewhat sticky, transparent in thin films and about the same color and cast as a heavy petroleum cylinder oil. It is made by alkylating a high molecular weight condensation product, formed from benzol and ethylene dichloride. Also, products can be obtained of lower molecular weight by a similar process, which are viscous, oily liquids and can be used straight as gear oils, cylinder oils, and the like. The alkylation renders the resin more readily soluble in the oil. Substances of comparable molecular weight are used by Otto and Mueller-Cunradi, Pat. No. 2,084,501, for purposes of viscosity increase and viscosity index improvement. These substances are polymerized iso-olefines, and it is stated that they may be added in amounts of fractions of 1% up to as much as 50%.

Sludge-dispersing properties are ascribed to synthetically produced hydrocarbon oils, which are added in amounts of 1% or 2% to petroleum lubricating oils, Rosen 2,069,273 and 2,069,274. How the agents act is obscure, but it seems clear that the sludging tendency of the oil can be minimized as measured either in actual operation in the engine or by the Sligh numbers of the oils. The patentee ventures to suggest that the so-called dispersing agent may in fact reduce agglomeration or polymerization and maintain the materials which have agglomerated in suspension. The substances are synthesized from unsaturated lubricating fractions of paraffin or mixed base crudes or from cracked waxes, with or without addition of benzol, naphthalene or other aromatic hydrocarbons. Condensation is effected at 200° or 250° F. The use of temperatures below 150° F. gives rise to pour inhibitors.

U. S. PATENTS ON MINERALOID SYNTHETIC LUBRICANT ADDITIVES

1. Heitmann, 1,593,762, July 27, 1926. Oils, for instance mineral and tar oils, are subjected to electric discharges to render them emulsifiable.

2. Heitmann, 1,632,027, June 14, 1927. Polymerized or Voltol oils produced by electrical treatment are used as emulsifying agents in soapless greases.

3. Davis, 1,815,022, Standard Oil Development Co., July 14, 1931. A synthetic hydrocarbon oil formed by condensation of a waxy hydrocarbon with an aromatic hydrocarbon is added to wax-containing heavy viscous petroleum oil in order to lower the pour point.

4. Miller, 1,869,608, Standard Oil Co. (Indiana), Aug. 2, 1932. Asphaltene-like polymerization bodies derived from hydrocarbon oils are extracted by means of solvents from deposits in fuller's earth filters and added to oils to improve the color.

5. Lincoln and Henriksen, 1,945,615, Continental Oil Co., Feb. 6, 1934. Hydrocarbon waxes are chlorinated and condensed by means of sodium ethoxide. By the addition of 1 per cent of the product, the pressure at which the lubricant broke was raised from 10,500 to 13,500 pounds per square inch.

6. Maverick, 1,963,239, Standard Oil Development Co., June 19, 1934. A gear oil with a few per cent of an unctuous synthetic prepared by condensing chlorinated paraffin with or without aromatic hydrocarbons such as benzol and naphthalene in the presence of $AlCl_3$. The fluidity and plasticity at low temperatures is improved, and channeling is reduced.

7. MacLaren, 1,963,917, Standard Oil Co. (Indiana), June 19, 1934. An improved condensation product is added to lubricating oils for the purpose of lowering their cold tests and improving their viscosity indices. The condensation product is similar to that of Pat. No. 1,815,022, but is said to be more effective.

8. MacLaren, 1,963,918, Standard Oil Co. (Indiana), June 19, 1934. A condensation product termed "Pourex" is prepared from chlorinated paraffin wax and naphthalene and used to lower the cold tests of oils, similar to Pat. No. 1,963,917.

9. Osterstrom, 1,973,824, Pure Oil Co., Sept. 18, 1934. An object is to produce a hydrocarbon lubricating oil

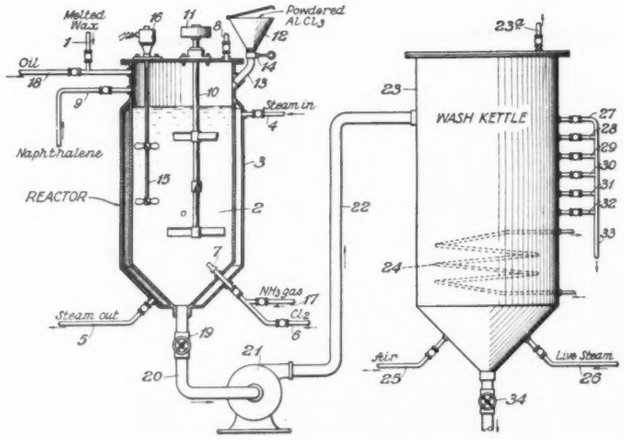

Fig. 2. Diagrammatic view of apparatus used in synthesis of pour depressor. (MacLaren, Pat. No. 2,057,104)

which, when blended with ordinary lubricating oils results in lowering the pour test. In redistilling a wax distillate by cracking, a non-pressable residue is left which, when mixed with a fraction of a vapor phase cracked distillate of desired boiling range treated with a small percentage of aluminum chloride, produces the blending oil.

10. Shaffer and Fasce, 1,988,753, Standard Oil Development Co., Jan. 22, 1935. A product which will impart green fluorescence to lubricating oils, and in many cases also improve the pour point is prepared by adding anthracene to a sulfur dioxide extract obtained in the refining of kerosine distillates or light lubricating oil by the well-known Edeleanu process, and treating the mixture with aluminum chloride.

11. Moser, 2,010,606, Shell Development Co., Aug. 6, 1935. A mineral oil is extracted with liquid SO_2 and the extract is polymerized either by mild heating or by treatment with a catalyst such as $ZnCl_2$. The product is green fluorescent, and when added to a lubricating oil colors same and also lowers the pour point.

12. Frolich, 2,015,748, Standard Oil Development Co., Oct. 1, 1935. A pour inhibitor is produced by condensation of naphthalene with a highly chlorinated paraffine in the presence of a catalyst of the type of aluminum chloride, removing the excess of naphthalene, and then condensing the first condensation product with a less highly chlorinated paraffin.

13. Rabe, 2,028,472, I. G. Farbenindustrie A. G., Jan. 21, 1936. A polynuclear aromatic hydrocarbon is condensed with either an aliphatic olefin or a halogenated paraffin wax. The condensing catalyst is aluminum chloride containing a minor amount of a halide of a metal selected from the 1st and 2nd groups of the periodic system. The product is a paste which when dissolved in lubricating oil gives the latter a green fluorescence which is stable to light and oxidation.

14. MacLaren, 2,030,307, Standard Oil Co. (Indiana), Feb. 11, 1936. An improved pour point depressor prepared from condensation of a chlorinated paraffin wax with naphthalene in the presence of aluminum chloride. Only the dichloro derivatives of the wax are used; the monochloro derivatives giving an inferior product are discarded.

15. Winning and Young, 2,045,742, Standard Oil Development Co., June 30, 1936. Polymers produced by condensation of paraffin wax and aromatics, or by the condensation of chloro-paraffin alone, or polymers produced during the condensation of acids, esters, alcohols, or ketones, are employed as pour point inhibitors. The sensitivity of oils to pour point reduction is improved by the removal of certain colloidal materials.

16. Sloane, 2,045,806, Standard Oil Development Co., June 30, 1936. Synthetic pour point depressants of the type described in patent 1,815,022, made for example by the condensation of waxy hydrocarbon and naphthalene, contain relatively active and inactive components. Con-

Welded Steel Pressure Vessels for Refinery Service

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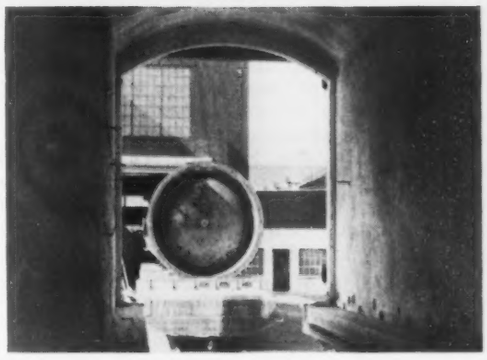

The above illustrations show two refinery vessels coming out of the stress relieving furnace at our Birmingham plant and a view from the inside of the furnace. Work stress relieved here includes Bubble Towers, Fractionating Columns, Cracking Chambers, Polymerization Process Towers, Accumulators, Butane Tanks, Evaporators, Oil Stills, Propane Tanks, Reaction Chambers, Absorber Towers, Flash Towers, Reforming Towers, Reflux Towers, Stripping Towers, Vacuum Towers, Pressure or Vacuum Vessels for All Purposes.

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Tulsa.....1607 Hunt Bldg.	Detroit.....1513 Lafayette Bldg.	Los Angeles.....1422 Wm. Fox Bldg.
New York.....3345-165 Broadway Bldg.	Birmingham.....1534 North 50th Street	Boston.....1516 Consolidated Gas Bldg.

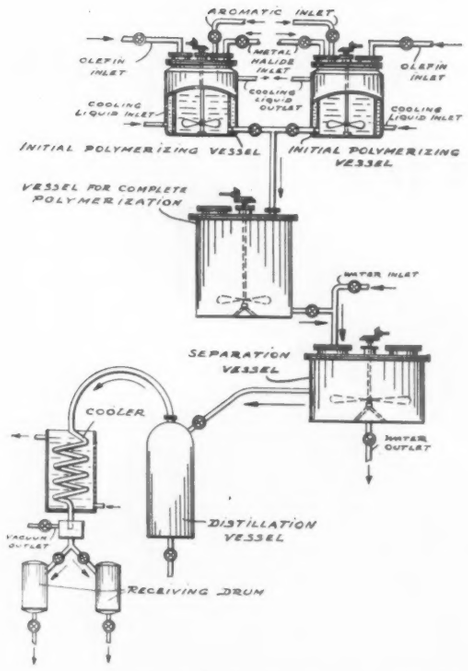

Fig. 3. Schematic layout of equipment used in producing synthetic fluorescent material. (Hartmann and Rabe, Pat. No. 2,071,521)

centration of the more active fractions is accomplished by various means.

17. Gleason, 2,049,058, Standard Oil Development Co., July 28, 1936. Wax modifiers which reduce the pour point of lubricating oils, which contain wax, or other enumerated solidifiable materials, and which may also be used as wax separation aids are prepared by first condensing chlorinated waxy hydrocarbons with a chlorinated cyclic hydrocarbon by means of aluminum chloride, and removing remaining halogen and producing a further condensation by means of a condensing reagent of the type of sodium. It is especially desirable that the wax modifiers contain only carbon and hydrogen. If desired, however, oxygen—and nitrogen—containing condensation products may similarly be produced.

18. MacLaren and Stockdale, 2,057,104, Standard Oil Co. (Indiana), Oct. 13, 1936. Improvements in preparing synthetics of the type described in patents 1,963,917 and 1,963,918, obtained by reacting naphthalenes with chlorinated wax, consist in certain purification steps.

19. Davis, 2,062,354, Standard Oil Development Co., Dec. 1, 1936. Products are made similar in properties to the synthetic of Pat. 1,815,022, but differing in absence of cyclic hydrocarbons. Paraffin wax, montan wax, ceresin, or hydrocarbon oils rich in such substances are chlorinated or brominated and condensed with aluminum chloride. If desired, prior to the condensation or polymerization, halogen my be split from the hydrocarbon, resulting in a dehydrogenated wax.

20. Towne, 2,064,506, The Texas Co., Dec. 15, 1936. A wax crystal modifying agent useful in dewaxing oil, and also, apparently, for lowering pour point and imparting bloom to mineral lubricating oils, is prepared from hydrocarbon gases, such as oil gas from cracking stills, or from natural gases, fixed gases from the stabilization of natural gasoline, storage relief gases, as well as individual constituents thereof, such as propane and butane. The hydrocarbon gases are subjected to high temperature polymerization in a cracking still. High boiling constituents are separated.

21. Rosen, 2,069,273, Standard Oil Development Co., Feb. 2, 1937. Sludge dispersers of paraffinic nature are produced synthetically by condensation or polymerization of the less volatile fractions of paraffin or mixed base oils which have been rendered unsaturated by cracking or other means. Condensation with cyclic hydrocarbons is also contemplated, and with their hydrogenated derivatives. Condensation is effected by various means, by aluminum chloride, by electric discharges. Just what action these "sludge dispersers" perform, is not clear. Incidentally, some act as pour point inhibitors.

22. Rosen, 2,069,274, Standard Oil Development Co., Feb. 2, 1937. Similar to Pat. No. 2,069,273. The "condensates without pour inhibiting properties" are claimed.

23. Hartmann and Rabe, 2,071,521, I. G. Farbenindustrie Aktiengesellschaft, Feb. 23, 1937. Substances which, dissolved in mineral oil, impart green fluorescence, are obtained if liquid aliphatic olefines are condensed with polynuclear organic substances in which none of the nuclei is saturated with hydrogen, at high temperature in the presence of aluminum chloride. Examples of suitable polynuclear substances or naphthalene, anthracene, phenanthrene, and carbazol. The olefines are produced by cracking paraffin wax, petrolatum, or paraffinic oils, or by dehydration of octodecyl alcohol.

24. Fulton and Mikeska, 2,072,107, Standard Oil Development Co., March 2, 1937. Polymers or condensation products which both thicken and reduce the temperature-viscosity curve of lubricating oils are obtained by reaction of ethylene dichloride or other dihalogen substituted short chain aliphatic, with benzol, naphthalene, anthracene, phenols, aniline, pyridine or other cyclic material, to form a condensation product. The chemical structure of the product is believed to be that of cyclic units alternating with aliphatic chains. Physically, these products, when over 1,000 molecular weight, are not very soluble in lubricating oils, but by further treatment, i.e., hydrogenation or alkylation can be rendered soluble. An example of the latter would be reaction with amyl chloride.

25. Moser, 2,080,088, Shell Development Co., May 11, 1937. Pour points of lubricating oils can be reduced by use of a selected portion of a polymerized Edeleanu extract.

26. Otto and Mueller-Cunradi, 2,084,501, I. G. Farbenindustrie Aktiengesellschaft, June 22, 1937. High molecular weight hydrocarbons, produced by polymerizing iso-olefines and in particular iso-butylene, considerably improve the properties of hydrocarbon mixtures, particularly the viscosity, and also the temperature-viscosity curve.

Inspection Characteristics of Polymerization Products from I-butylene, Employed as Synthetic Lubricant Additives (U. S. P. No. 2,084,501)

Expt.	Percentage isobutylene polymerization product	Viscosity in " Engler at— 0°	20°	38°	50°	100°	150°
A	0	125	25	8.3	. .	1.6	Below 1.2
A′	6	170	42	15.6	8.8	2.25	1.44
B	0	46	11	5.3	3.0	1.45	Below 1.2
B′	4	98	29.5	12.9	7.7	2.25	1.47
C	0		..	3.3	2.1	1.3	..
C′	4	110	33	13.9	8.2	2.32	1.48
C″	13	280	84	35.2	21.8	5.0	2.18
D	0	12	4.8	2.55	2.0	1.3	...
D′	6	55	20.5	9.8	6.5	2.25	1.52
E	0	225	41	12.9	7.0	1.8	1.22
E′	1	About 280	58	19.1	10.3	2.3	1.42
F	0	About 300	63	20.2	11.1	2.3	1.4
G	0	Over 300	73.5	21.8	11	2.12	1.32
H	0	Over 300	83	25.3	13	2.5	1.45

Expt.	Viscosity index	Setting point ° *Below zero*	Flash-point °	Density at 20°
A	60	8	242	0.880
A′	120	13	242	0.880
B	40	6	215	0.870
B′	134	12	215	0.870
C		50	180	0.885
C′	134	45	180	0.885
D		9	185	0.860
D′	Over 140	12	185	0.860
E	67	2.5	221	0.914
E′	105	5	222	0.914
G	65	16	235	0.904
H	96	..	..	..
F	104	7	234	0.883

27. Davis and Swoope, 2,087,682, Standard Oil Development Co., July 20, 1937. Pour inhibitors are produced by condensing an olefine of the type derived from chlorinated paraffin wax on naphthalene at a low temperature, and stopping the reaction prior to the final stage.

Cracked gasoline production outstrips straight run gasoline for the first time

In 1936 cracking processes provided 239,620,000 barrels of gasoline. This was the first year cracked gasoline outstripped straight run gasoline as a source of motor fuel.

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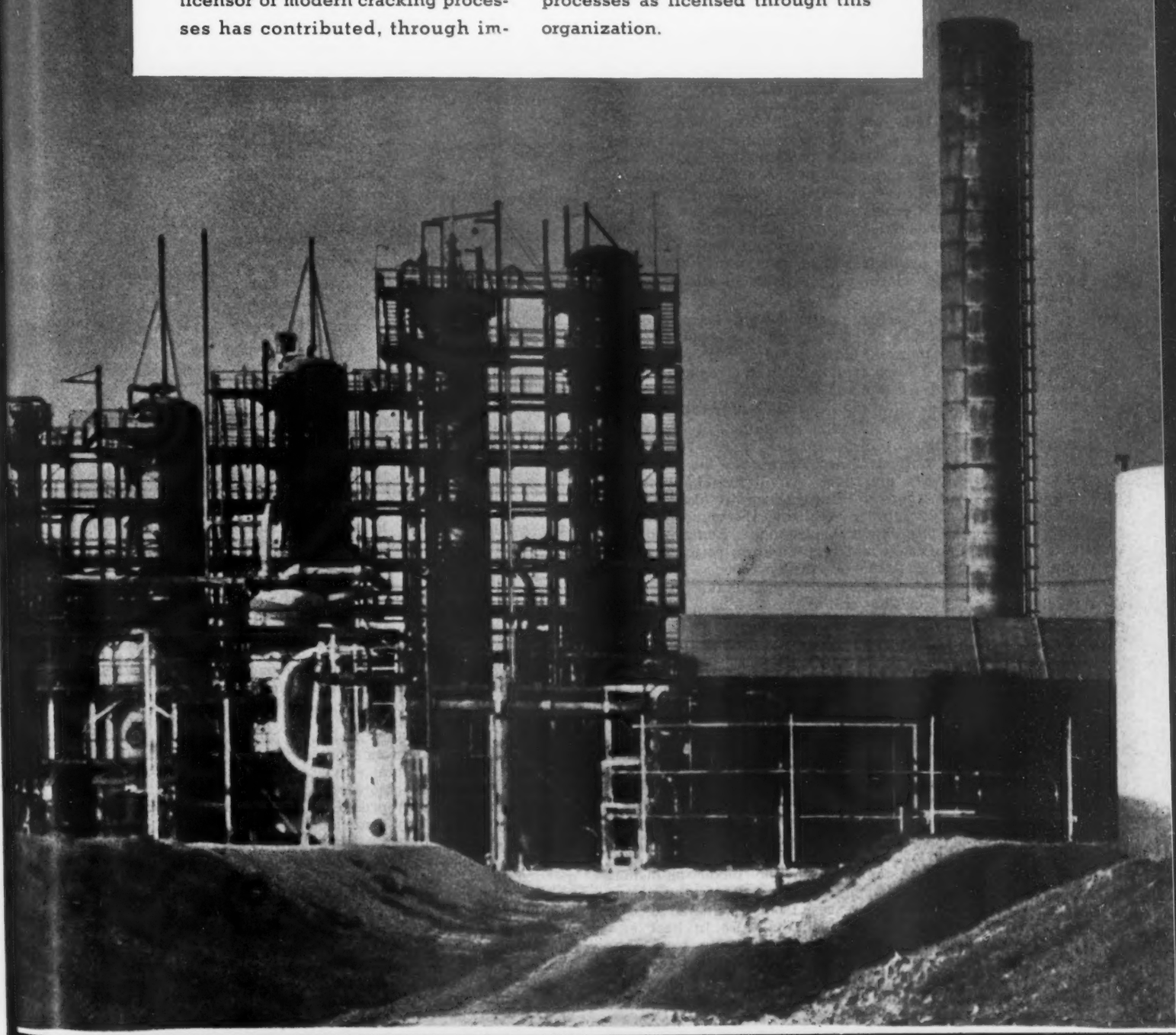

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By M. G. VAN VOORHIS

Solvent Extraction

Solvent extraction by Rectiflow principle is employed by Shell group in new British plant. Pet. Times, Oct. 30, 1937, *p.* 557.

• Solvent refined lubricating oils are manufactured by Shell Refineries, Ltd., employing the Rectiflow principle,* developed by Shell, which is the counterpart in extraction of continuous rectification in distillation. Extract solution is washed with a portion of the extract, usually referred to as "backwash". Complete separation of extract and raffinate is effected as successfully as in the two-solvent process and at less cost. Cost is higher than the conventional counter-current process but the addition is more than offset by higher yield, particularly for crudes of low lubricating oil content or those in which separation is difficult.

Furfural was selected as the solvent because of its selectivity at relatively high temperature. Application of temperature is important since selectivity decreases and solvent power increases rapidly with increasing temperature. To obtain maximum effect a temperature gradient should be maintained along the extraction system.

Extraction stages are being used instead of extraction towers in view of disadvantages in the latter such as lack of control on size of droplets and on the exchange, tendency to channel, and poor compromise between intimate mixing and good settling. A serious disadvantage of towers is the difficulty in realizing the right temperature gradient for optimum extraction. Removing the liquid to outside coolers and redistributing at appropriate temperatures in the tower practically reduces the tower to a set of mixers and settlers. It was therefore decided to use mixers and settlers instead of towers.

Settlers are of the gravity type, preferred for lower cost and reliability over centrifuges. Seven settling units are built one on top of the other to appear as a single tank. Inlets and outlets in each stage are coupled up so that the delivery from the pump and the suction from the stage above are interconnected. The reason for this is that the floor of each section is not strong enough to stand the weight of the liquid in that section and the sections above it, and, therefore, means have been provided to allow the liquid to pour through the whole seven stages if necessary.

For any given stage the extract phase is withdrawn from the bottom of the stage above and the raffinate phase from the top of the stage below. These pass to the mixer for the given stage. From the mixer emulsion flows through a pump and heat exchanger into the given stage. As temperature decreases from raffinate to extract, heat is withdrawn from the mixture in heat exchangers using cold extract solution returning from the last section of the extraction plant. There are two settling tanks of seven compartments each. One serves to carry out the extraction and the other the washing with reflux.

Recovery of furfural was a problem. Clean separation of furfural from raffinate and from extract was necessary. This is done in rectifying towers at as low temperature as possible to avoid formation of pyromucic acid and acetic acid. Water must also be separated.

The question whether evaporation using a so-called "double effect" principle was examined but discarded chiefly because it involved higher temperatures. The plant has operated successfully with a feed of 10 tons per hour using 29 tons per hour of furfural. Backwash is 1.6 tons per hour, temperature gradient is 117° C. to 65° C. (242.6 to 149° F.), and yield of raffinate is 76% by volume. The analysis of intake and products is as follows:

	Intake 100 vol. per cent	Raffinate 76 vol. per cent	Extract 24 vol. per cent
Specific gravity at 60° F.	0.915	0.885	1.005
Flash point (P. M.) closed	445° F.	430° F.	425° F.
Flash point open	475° F.	455° F.	455° F.
Visc. Red. I at 70° F.	.....	.....	.....
140° F.	167 secs.	121 secs.	900 secs.
200° F.	58 secs.	52 secs.	160 secs.
Kin. Vis. at 100° F.	.....	74	1976
160° F.	26.2	.....	.....
210° F.	11.65	10.07	31.45
Kin. V. I.	90	122	<−50
Pour point, A.S.T.M., ° F.	110	115	35
Acid value, mg. KOH/gm.	0.1	0.014	0.028
Color, A.S.T.M.	4½*	4*	.....
Refractive Index, 50° C.	41.920	1.4685	1.5575

*Diluted 85 vol. white spirit, 15 vol. oil.

The raffinate leaving the Rectiflow plant contains about 20% wax. A solvent dewaxing unit designed by the Lummus Co. is employed. As a dewaxing solvent a mixture of benzol and methyl-ethyl ketone is used instead of the common benzol-acetone mixture because a greater tolerance in the exact relative composition of the solvent mixture is allowable without materially affecting the selectivity.

Oil is finished with earth treatment in which a mixture of earth and oil is fed to a pipe heater.

* * *

Wax Determination and Analysis

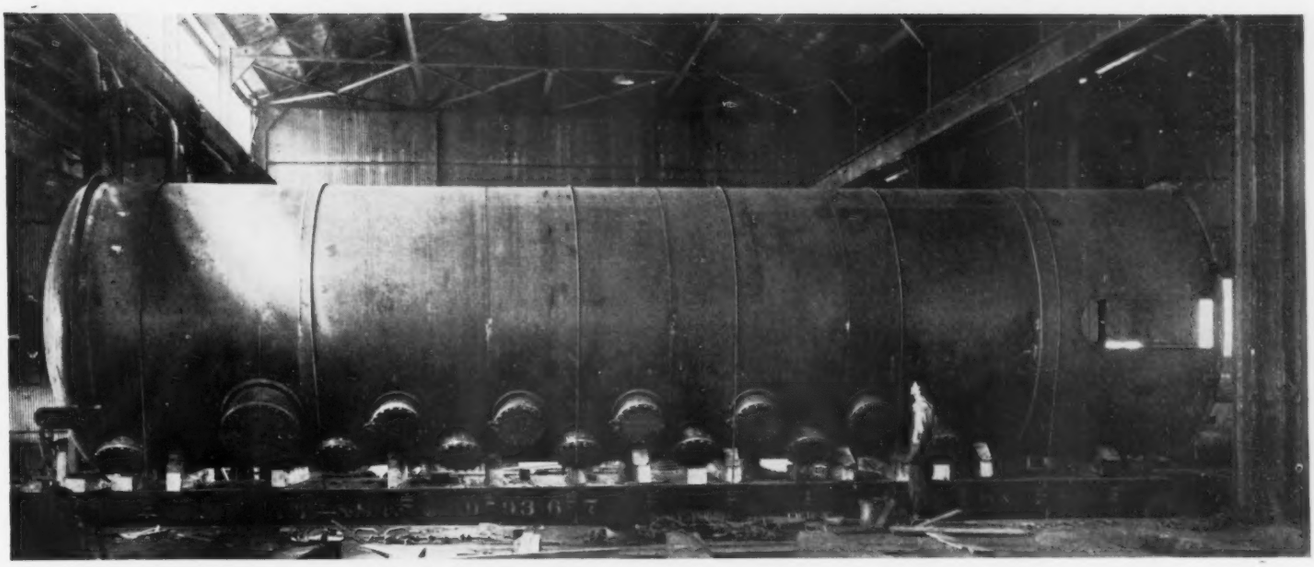
Wax content can be determined more advantageously by crystallization from ethylene dichloride. D. S. McKittrick, H. J. Henriques and H. I. Wolff, Jour. Inst. Pet. Tech., Oct. 1937.

• Determination of wax content of oil by the method of crystallization from ethylene dichloride at —35° C. (—31° F.) or from chloroform at —55° C. (—67° F.) is more accurate and reproducible and of much wider applicability than any previously published. All known methods have had some drawbacks. The Holde method, which is standard, gives a measure of the *solid* wax suspended in the oil at about 20° C., with no indication of the amount of higher- and lower-melting waxes still in solution.

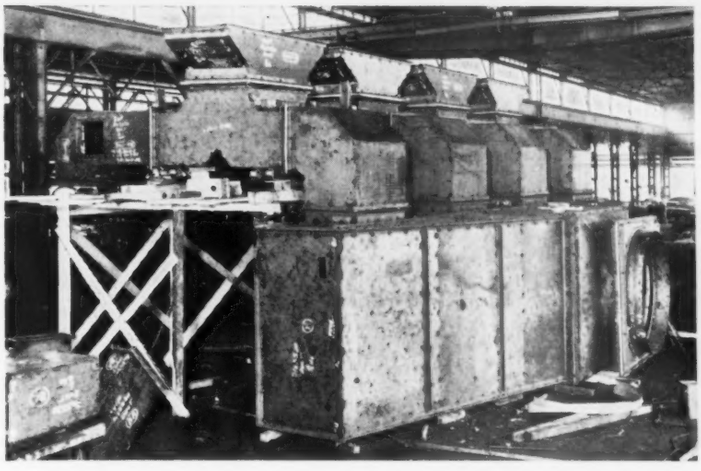
The new method overcomes past limitations. It is applicable to residues or distillates from all types of crudes, and is not sensitive to asphalt. It may be used to determine oil in wax as well as wax in oil. In the same apparatus a fractional crystallization of a wax sample can be made to yield data on composition. A single crystallization is sufficient when only proportion is desired. Ethylene dichloride is satisfactory for all ex-

(*Continued on page R-372*)

*Theory in Proceedings 1933 World Petroleum Congress, Vol. II, p. 352, Patents—Neth. 29,077 and 33,941.



12′ x 51′-3″ Vacuum Steam Still 5/8″ Heads — 1/2″ Shell



(Above)—Breeching for Tube Type Heater

(Right) — Berquist Bins for Carbon Black Plant

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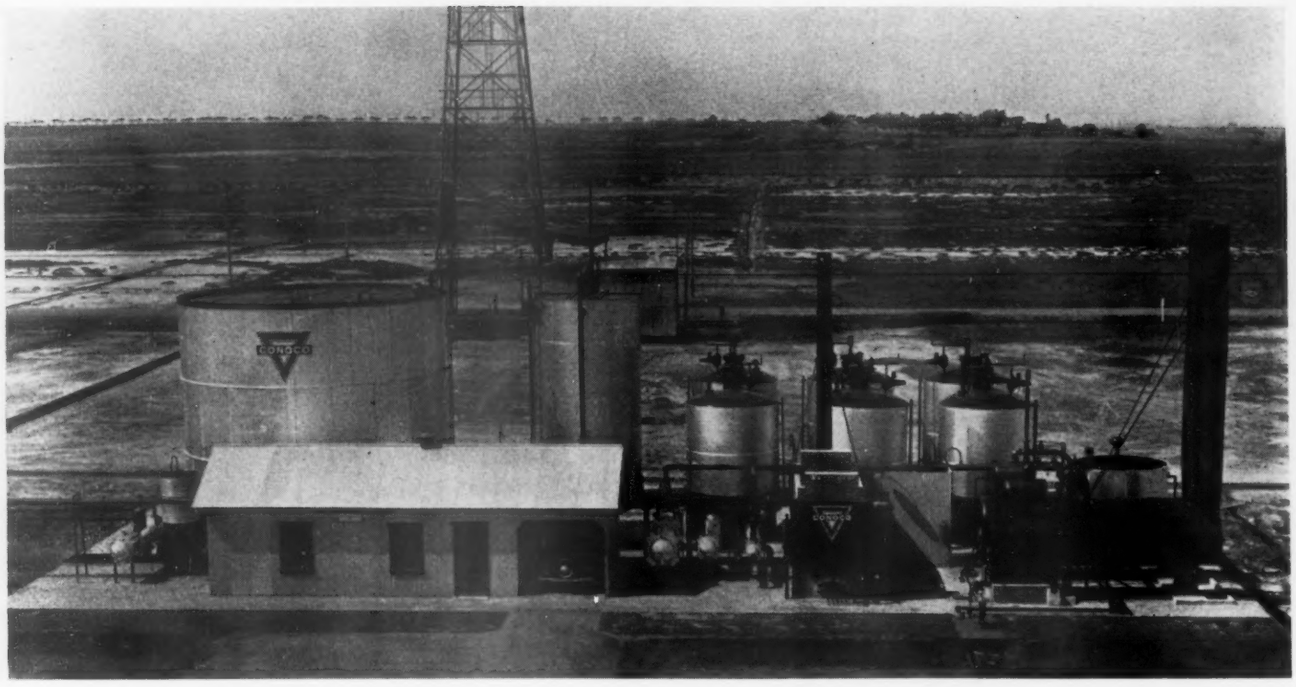

Fig. 1. A thermal dehydrator plant, converted from a steam generating plant, by the addition of a tube type direct-fired heater, and heat exchange equipment

546.3

Saves $1000 A Month by Thermal Dehydration

By R. W. FRENCH*

Presented before the Fall meeting of the Petroleum Division, A.I.M.M.E., Los Angeles, Calif., Oct. 1, 1937.

Abstract

A thermal dehydrating plant was made from an older steam-generating plant, adding a direct-fired tube type heater and heat exchange equipment.

The total installation cost per million B.t.u. heat transfer is $845, fuel cost per million B.t.u. is six cents. Direct heat type of emulsion heater reduces installation costs by $5180 compared to steam heating equipment, and cuts fuel expense $1840 annually. A plant heat balance, and heat exchanger calculations are given.

THE heating of crude oil emulsions during treatment to reduce water content is very common, particularly in central plants. Many types of heat source are now in use with converted fire-box boilers, tubular boiler heaters, small vertical boiler heaters, and various waste-heat exchangers supplanting the use of high-pressure live steam with its low efficiency and attendant high cost[1]. The direct-fired pipe still type heater with relatively high efficiency may provide an economical source of heat for a central plant whose throughput is large and whose probable life will be long enough to realize the full benefit of operating savings.

Usual dehydrator plant operation provides a flow of hot clean oil, hot waste water, and often exhaust steam from circulating pumps, accompanying the flow of emulsion. From a thermal viewpoint the heat content of the first three fluids may be thought of as byprdoucts whose value is lost unless proper heat exchange equipment is installed to utilize them. Also, with few exceptions, it is desirable that the clean crude oil run to field storage at the lowest practicable temperature to minimize evaporation with its corollary volume and gravity loss. Hence, the installation of heat exchange equipment, by taking advantage of this favorable situation, may yield considerable fuel saving as well as over all operating economy.

*Continental Oil Co., Los Angeles, Calif.

Installation Description

The plant used as an illustration herein was reconstructed from an older, live-steam plant which had been in use for ten years. Although much of the older equipment was necessarily retained, the construction of a direct-fired pipe still type heater was followed by the installation of fairly complete heat exchange equipment and controls.

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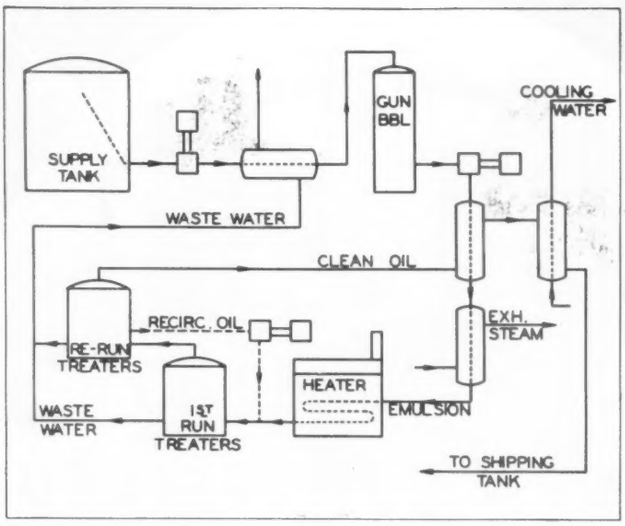


Fig. 2. Diagrammatic flowchart of the thermal dehydrator

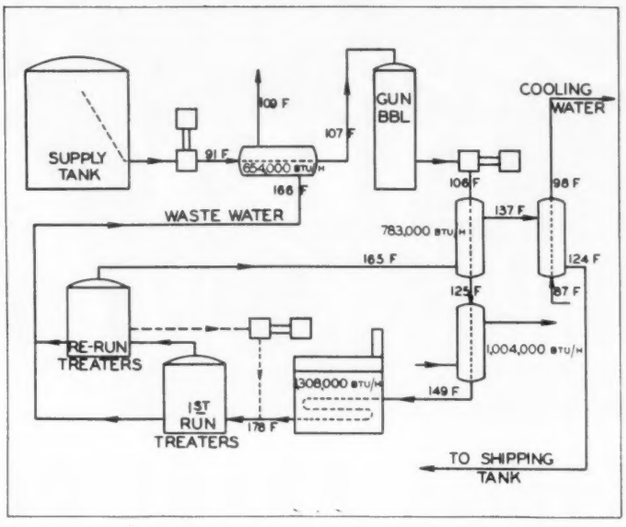


Fig. 3. Flow sheet showing where each increment of heat is added to the emulsion, and how much

Because a turbine-driven water pump used for lease emergency and fire service required the use of one boiler in service, and the former steam pumps were capable of serving the new plant, two boilers of the original four were included in the new plant. The exhaust steam from the pumps serves to raise the temperature of the emulsion entering the heater. Of course, in a completely new plant without external steam requirements the pumping might advantageously be accomplished by electrical, or internal-combustion prime movers with the tube type heater furnishing all primary heat.

Plant Capacity

Although the present daily volume of clean oil dehydrated averages approximately 3500 barrels, the plant normal capacity is 4500 barrels and amounts as high as 7000 barrels have been handled. The average water content of the emulsion furnished the plant is fifty per cent, but this quantity is reduced more than half by the settling action which takes place in the supply and decanting tank, and gun barrel. Wet gravities of gun barrel discharge range ordinarily from 16° to 24° A.P.I. with the clean oil averaging 27° A.P.I.

Plant Layout

As shown in Fig. 1, the plant is laid out in a compact manner to minimize piping expense and upkeep, and to facilitate operation. The supply tank, gun barrel, pump house, heat exchangers, heater, and treaters may be identified easily. All piping except the steam lines is in concrete trenches covered with subway grating, and insulation is provided wherever desirable. Automatic control and recording devices are in general use, including pressure regulators on plant pumps, stroke counter on recirculating pump, liquid-level controllers on treaters, thermostatic control on heater fuel, back-pressure regulator on treater discharge main, and various recording temperature and pressure gauges.

Heating Sequence

Movement of the fluids involved through the plant is shown in the schematic flow diagram, Fig. 2. From the supply tank the crude oil emulsion is pumped through the first pair of heat exchangers which utilize the heat content of the waste water efflux from the treaters. As the emulsion proceeds through the gun barrel some waste water is freed by the action of the heat and chemical injection. The circulating pump then forces the emulsion through a heat exchanger which makes use of the heat in the clean oil from the treaters. The lowering of the temperature of the clean oil is also important since it decreases the size of exchanger and volume of cooling water necessary in the final unit which reduces the clean oil to proper shipping temperature. In some installations this would mean corresponding decreases in the cost of cooling towers and pumping equipment.

Immediately following the clean oil exchanger are two exchangers serving to transfer the latent heat of the pump exhaust steam to the emulsion. By this time the emulsion has reached a temperature close to 150° F. which is increased to around 177° in the heater. Thermostatic temperature control operates to fire the heater at rates which will maintain constant the proper temperature for treater intake. After the emulsion has proceeded through the first four treaters, the cleaned oil passes through the two rerun treaters which reduce the water content from around one and three quarters per cent to one-half of one per cent. From these treaters the clean oil runs to the shipping tanks after giving up its excess heat in the clean oil exchanger and cold water exchanger respectively. A recirculating pump maintains movement of some clean oil from the treaters back into the intake of the first run treaters. This procedure was found necessary to maintain optimum treater functioning.

Heater Data

The direct gas-fired heater used in this plant is of the tube still type familiar to refinery practice. Constructed of salvaged drill pipe and boiler flues in a steel and brick setting, its cost was slightly more than one-quarter of that necessary to install live-steam equipment to accomplish the same heating. A pressure-relief valve provides protection against emergencies; the sloping furnace floor is equipped with a drain line and trap in case of tube failure; a water line is connected to the inlet so that the coils may be protected in case of circulation failure; and a steam line is connected to the furnace to smother fire if necessary.

The heater was designed to supply 1,500,000 B.t.u. per hour at conservative ratings, but has yielded over 2,000,000 without difficulty on occasion. Maximum heat intensity seldom exceeds 10,000 B.t.u. per square foot of heating surface, and the pressure drop through the heater at peak loads reaches 30 pounds per square inch. Heater efficiency as illustrated by Fig. 4 varies from 70 to 78% in the operating range. An incidental feature of this type heat source is that emulsion temperatures necessary for proper treater functioning may be from 10° to 15° below those of live-steam plants as a result of the constant temperature maintained by this single controlled source. A comparison of costs between this direct-fired heat source and a minimum-cost live steam installation yields very significant results. Total installed costs per million B.t.u. of output are $845 in the case of the direct-fired heater contrasted with $3150 for the live-steam equipment with fuel costs, on the basis of millions of B.t.u. per hour output, of 6 and 21 cents re-

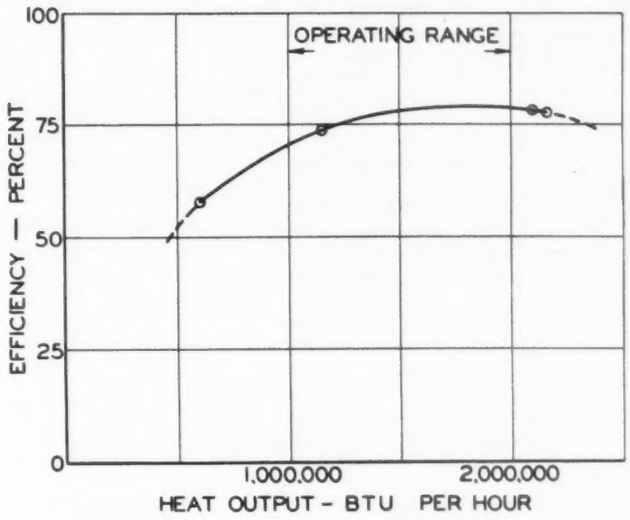


Fig. 4—Curve showing the efficiency of the direct-fired heater

spectively. These savings in a direct-heat plant of the size under consideration are equivalent to an installation economy of $5180 and an annual decrease in fuel expense of $1840. Maintenance costs, also on the direct-heat unit should be much lower.

Heat Balance

Continuous-flow heat exchangers or recuperators of the counter-flow type are used in the plant discussed above to conserve and convert to useful purpose the economically available waste heat of various fluids. As shown by the typical flow chart in Fig. 3 a total of 2,441,000 B.t.u. per hour or 65% of the total heat supplied to the emulsion is contributed by these exchangers. Of this amount, 27% is yielded by the waste water efflux, 32% comes from the preliminary cooling of the cleaned oil, and the remaining 41% is furnished by the condensing of exhaust steam which is then available as boiler feedwater. Of course, these proportions vary with changes in emulsion throughput and composition, but in general their total remains a fairly constant proportion of the entire heat supplied the emulsion. If the exhaust steam were not available here, the other heat exchangers would supply about 40 per cent of the necessary heat, and it might then prove economically justifiable to take further advantage of the residue waste heat in the outgoing clean oil. Over-all heat distribution for the entire plant is summarized in the subsequent table and emphasizes, from a thermal viewpoint, the disproportionate amount of plant fuel required by the boiler.

TABLE I

Plant Heat Balance

		B.t.u./hr.	Per Cent
Total Heat Value of Plant Fuel		5,220,000	100.0
A Boiler Input			
1. Heat used in pumping plus steam exchanger and radiation losses		1,251,000	24.0
2. Heat transferred through exhaust steam to emulsion		1,004,000	19.2
3. Boiler losses		1,270,000	24.3
Total		3,525,000	
B Heater Input			
1. Heat transferred to emulsion		1,308,000	25.1
2. Heater losses		387,000	7.4
Total		1,695,000	
C Heat Balance of Fluids			
1. Heat input (A,2 plus B,1 above)		2,312,000	
2. Heat lost in discharge			
Clean oil	928,000		
Cooling water	423,000		
Waste water	240,000		
		1,591,000	
3. Heat lost by radiation and conduction		721,000	

In considering an installation of heat exchange equipment some of the factors of importance are: throughput or velocity of fluids; gravity and water content of emulsion; entrance and exit temperatures given or desired for both fluids; probable values of the mean transmittance or heat transfer coefficient; area of heating surface; pressure losses; and effect of any corrosive influence. Of course, the throughput rates are usually established and with the fluid characteristics indicate the limits of size so far as pressure loss is concerned. Probable effective values of the heat transfer coefficient may be assumed from experience or obtained from the manufacturer who may also furnish data on temperature ranges and fluid velocity as well as pressure loss and corrosion effects. Since an infinite amount of heating surface would be required to utilize all the heat available, it is obvious that the economical amount to install is determined by consideration of the actual value per unit heat output in each instance.

Since calculations of heat transfer involving the interrelation of temperatures, velocities, surface areas, and variations in the heat transfer coefficient, etc., are subject to errors of at least 10%, the following example will illustrate practical approximations. More exact and detailed mathematical treatment may be obtained from a study of various reference volumes[2].

In the case of a counter-flow heat exchanger having 13,300 pounds hourly of 166° F. waste water available to use in heating 230 barrels hourly of emulsion from 91° to 107° F., how much surface will be required and what will the exit temperature of the waste water be? The emulsion is 16.5% water and gravity of the oil content is 27° A.P.I.

Heat Required to Raise Emulsion 1° F.

The heat required by the water phase of the emulsion will be 16.5% of the 230 barrels hourly multiplied by the weight in pounds per barrel and by the specific heat in British thermal units per pound as follows:

$$230 \times 0.165 \times 350 \times 1.0 = 13{,}300 \text{ B.t.u./hr.}$$

The heat required by the oil is calculated in the same manner but using weight per barrel and specific heat for 27° A.P.I. oil at a mean temperature of 99° F.

$$230 \times (1.0\text{-}0.165) \times 312 \times 0.458 = 27{,}500 \text{ B.t.u./hr.}$$

$$13{,}300 + 27{,}500 = 40{,}800 \text{ B.t.u./hr.}$$

Then the total heat required to heat the emulsion is,

$$(107\text{-}91 \times 40{,}800 = 654{,}000 \text{ B.t.u./hr.}$$

Heat Lost By Waste Water Per 1° F.

$$13{,}300 \times 1.0 = 13{,}300 \text{ B.t.u./hr.}$$

Hence, the probable temperature drop of the waste water with 100% effectiveness would be, $\frac{654{,}000}{13{,}300} = 49°$ F.

However, since experience indicates the net effectiveness is about 85%, $\frac{49}{0.85} = 58°$ F.

Thus, 166-58 or 108° F. will be the exit temperature of the waste water.

The mean temperature difference ($\triangle t_m$) may now be calculated by use of the following equation:

$$\triangle t_m = \frac{(T_1 - t_2) - (T_2 - t_1)}{2.303 \log \frac{(T_1 - t_2)}{(T_2 - t_1)}}$$

Where T_1 = entrance temperature of warmer fluid F.
T_2 = exit temperature of warmer fluid, F.
t_1 = entrance temperature of cooler fluid, F.
t_2 = exit temperature of cooler fluid, F.

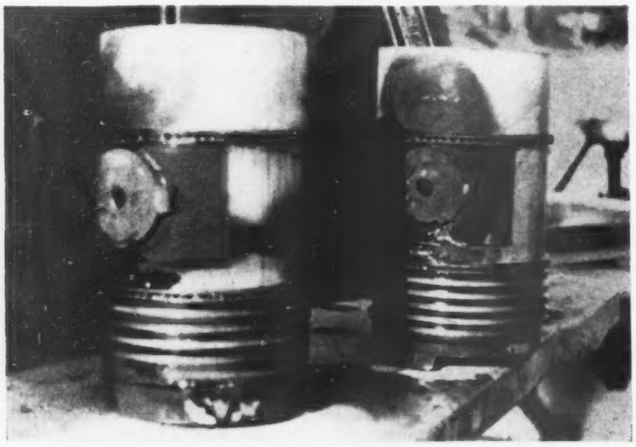
In this case:

$$\triangle t_m = \frac{(166 - 107) - (108 - 91)}{2.303 \log \frac{(166 - 107)}{(108 - 91)}}, \text{ or } 34° \text{ F.}$$

For frequent use, however, a graph of this relation plotted through the proper ranges will prove to be a time saver.

Next, the required surface is found (using a heat transfer coefficient, K, of 25 for the type of exchanger under

Pistons from a Caterpillar Diesel D-11000 Tractor after 4,200 hours operation on an SAE 30 Alox-blended Pennsylvania oil.



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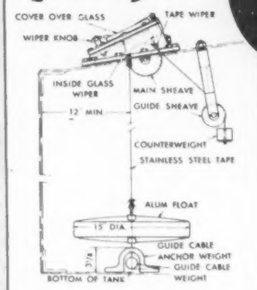

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consideration) by dividing the hourly heat supplied the emulsion by the product of the transfer coefficient and mean temperature difference.

$$\text{Area} = \frac{654{,}000}{25 \times 34}, \text{ or } 770 \text{ ft.}^2$$

This same relation, of course, is used to calculate the heat transfer coefficient in comparing performance results of various operating units with given surface areas.

Value of Results

Tangible improvements in operating effectiveness of the new plant under discussion are twofold. The average cut of the cleaned oil has been reduced from 1.75 to 0.5%. The gravity has been raised to such an extent that the average price per barrel received for all lease oil is more than eight mills higher, corresponding to a net increase in revenue of $980 monthly. And additional gravity improvement is expected to follow the early installation of facilities which will further cool the cleaned oil through the use of sea water. The economies described in the foregoing paragraphs may be summarized for the subject plant as follows:

1) Installation saving, compared to live-steam unit, of $5180.

2) Fuel economy of 49%.

3) Maintenance expense reduction of 5%.

4) Net gain from improved quality of oil of $980 monthly.

These savings acted to lower unit treating cost 10%, and when combined with the revenue increase will return the cost of the plant reconstruction in seventeen months.

Acknowledgements

The writer wishes to thank W. K. Kirby, consulting engineer; E. K. Parks, Standard Oil Company of Calif., and C. H. Smith of C. F. Braun Co. for their suggestions in the preparation of this paper.

Bibliography

1. D. H. Fortine, "Oil-Treating Methods," Drilling and Production Practice, 1936, American Petroleum Institute, New York, 1937.

2. Alfred Schack, "Industrial Heat Transfer," (translated by H. Goldschmidt and E. P. Partridge) John Wiley & Sons, Inc., New York, 1933.

3. "Thermal Properties of Petroleum Products," Miscellaneous Publication No. 97, United States Department of Commerce, Washington, D. C., 1933.

"State of the Art"

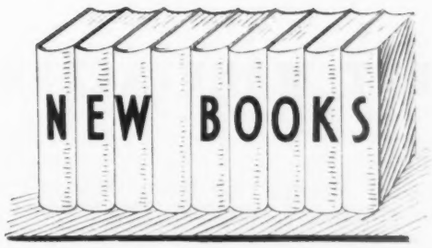
(*Continued from page R-366*)

cept highly paraffinic oils. Chloroform is used for these oils.

Apparatus is simple and allows cooling the solutions without transferring them to a second vessel. Tests of reproducibility were made by duplicate analyses with four oils. The results agreed within 0.5% of the total sample, or within 5% of the wax present. Results on samples containing about 5% wax indicated a reliability within 0.3% of the original sample or within 10% of the wax present.

Composition of waxes is accomplished through comparison of refractive indexes of the fractions obtained by fractional crystallization with refractive indexes of pure hydrocarbons. When the melting points of pure hydrocarbons are plotted against their refractive indexes the different series of hydrocarbons occupy areas that overlap somewhat but most of the compounds in the common area cannot be in the wax fractions.

Distillate wax curves are all similar. The portion of each in the region of higher melting points lies nearly parallel to the line for normal paraffins and fairly close to it. Refractive index decreases with melting point. As the curve progresses into the region of lower melting points, it rises rapidly above the normal paraffin line, crossing the *iso*paraffin and simple napthene fields into the aromatic and polynaphthene field. Thus the higher-melting fractions are chiefly normal paraffins, whereas the lower-melting fractions are rich in naphthenes or aromatics. Similar curves were drawn for the residue waxes and petrolatums.



Handbook of Chemistry

The cordial reception to the first edition of Lange's *Handbook of Chemistry* three years ago was the incentive to the publishers to urge upon the compiler a thorough revision which has been incorporated in the second edition, states N. A. Lange in prefacing this newly available edition.

Just the comparative difference in appearance and binding gives the impression of improvement but Mr. Lange assures those interested in keeping their reference shelf up-to-date that the revision is not a mere addition of other tables but that changes and corrections have been made to one or more items on exactly 408 pages. Many of these corrections represent advancements and refinements in date.

The changes in some of the atomic weights in the 1937 International Atomic Weight Table, especially that of carbon, necessitated changes not only in the gravimetric and volumetric factors but also in tabulated molecular weights of compounds. The whole table of Physical Constants of Organic Compounds, 4452 compounds, was affected.

None of the tables of the first edition has been eliminated. Among the additions to the book which increase its size by 237 pages, is an enlarged section on nomenclature including 13 pages of the more important organic ring systems illustrating the preferred names and numbering of the rings. A formula index to tabulated organic compounds has been added and melting points arranged in ascending order value. Data on refractive indexes adds over 150 pages. A table of viscosities of aqueous glycerol solutions has been included for calibration of viscosimeters and a dozen pages of formulas and authorized uses for denatured alcohol.

In the mathematical section of the book, compiled by Dr. R. S. Burington, Case School of Applied Science, the only change is the substitution of a table of factors for computing probable errors in place of a table of probability integrals.

Although the book is relatively new to technologists, Dr. Lange's experience in preparation of chemistry reference data goes back over a number of years as co-editor of the better known *Handbook of Chemistry and Physics*. Page size of the book is 5¼ x 7¾ inches which is larger than many of the older handbooks but it is still a book that is most satisfactory to handle with its flexible fabricoid binding and layout and type size make it convenient to read. While reference has been made only to addition and revisions it is evident that even a tabulation of contents of such a book is lengthy with no discussion and 1750 pages cannot be adequately covered in a paragraph.

Publisher of the book is Handbook Publishers, Inc., Sandusky, Ohio. Price is $6 postpaid.

* * *

Method of Determining Porosity

More and more emphasis is being given to core analytical work. The determination of pore space in an oil bearing formation is of high value in today's production practice. A late contribution on the subject is that of the U. S. Bureau of Mines. D. B. Taliaferro and E. J. Dewees, of the Bartlesville petroleum experiment station of the bureau, and T. W. Johnson, formerly of the Bartlesville station, have contributed Report of Investigations No. 3352.

In this they describe a method and apparatus developed by them. The report also includes a list of porosities of sands in a number of the country's principal fields.

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Activities OF EQUIPMENT MANUFACTURERS

High Temperature Steel Guide

Just prepared by the Timken Steel and Tube Division of The Timken Roller Bearing Co., Canton, O., is a "Guide for Users of High Temperature Steels," listed as Technical Bulletin No. 20. The folder presents data on seamless tubes and lists properties of 12 steels commonly used for high temperature service in oil refining and other industries.

* * *

Pyrometers

Potentiometer pyrometers, recorders and controllers are briefly described in a new bulletin (No. 493) just issued by The Bristol Co., Waterbury, Conn. The special features of the Pyromaster, a newly developed potentiometer with simplified operating mechanism, are outlined. Bulletin No. 494 on new electric flow meters is announced also.

* * *

Valves

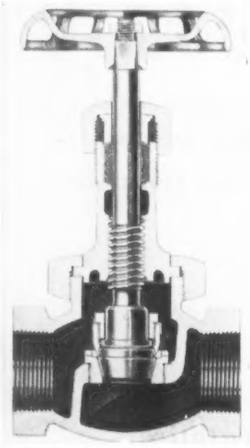
For severe service on small lines carrying steam, hot water, cold water, oil, gas and similar fluids, Crane Co., Chicago, is offering a line of brass globe and angle valves with plug type disc of nickel alloy and body seat ring made of a specially heat treated chromium iron.

* * *

Compressors

Clark Brothers Co., Olean, N. Y., has received orders for three additional 300-h. p. balanced-opposed electric driven compressors from Iraq Petroleum Corp. for its crude stabilization plant at Kirkuk, Iraq.

* * *



New Valves

Users of Jenkins standard bronze valves have the advantages of the new developments which add convenience and better service. A new handwheel design affords improved gripping, a new valve index plate gives replacement part numbers, and a new renewable composition disc is said to offer much longer life in steam service. A descriptive folder is available from Jenkins Bros., 80 White St., New York.

* * *

Refractories

Harbison-Walker Refractories Co., Pittsburgh, has just published an attractive 296-page book entitled Modern Refractory Practice. Arranged primarily as a handbook for the convenience of users of refractories, it is at the same time a source of general information for executives and others interested. First published in 1929, the book has been completely rewritten, and increased in size from 180 to 296 pages.

Various types of refractories are described, their sources, properties, selection and application in furnace construction. The book is divided into sections dealing with these subjects. The first section discusses each type of refractory separately, giving general information and including tabular material and illustrations in color, cataloging sizes and shapes available. This is followed by discussions and illustrations of different furnaces and their requirements. Two pages are devoted to the oil refinery. Then follows a section entitled Suggestions Regarding the Selection and Use of Refractories, a section on properties, and a final section of general information.

Users of refractories may obtain copies without cost. Regular price is $2.50. Colleges and universities may buy the book at $1.25 for single copies.

* * *

Publish Bulletin on Tube Cleaner

Bulletin Y-4, entitled "Tube Cleaners for Oil Refineries" has been issued by the Elliott Co. It covers equipment for cleaning carbon deposits from still tubes. Three different types of motors and six or more types of cutter heads are illustrated and described.

There is a discussion on cleaning return bends, lubrication, flexible joints, drills, brushes, operating hose and couplings, cleaners for small and large tubes, cleaners for curved tubes, and boiler tube cleaners. Copies are available from the Lagonda-Liberty Tube Cleaner Dept., Elliott Co., Springfield, Ohio.

* * *

J-M Official Promoted

Lewis H. Brown, president of the Johns-Manville Corp., announces that E. S. Crosby has been named president of the Johns-Manville International Corp., a subsidiary. He has been vice-president and general manager.

Mr. Crosby joined Johns-Manville in 1928 as general manager of the Engineering department.

In addition to his new post, Mr. Crosby is also general manager of both Asbestos Fibres Distributors and the Replacement Automotive Products Department, both divisions of the J-M Sales Corporation.

* * *

Pyrometer Catalog

The Brown Instrument Co., Philadelphia, has just published a new catalog (No. 1102) on potentiometer type pyrometers.

* * *

Diesel Exhaust

A folder describing ways to install exhaust lines for diesel engines has been issued by The American Brass Co., Waterbury, Conn., manufacturers of flexible metal hose.

* * *

Laboratory Equipment

Fourth issue of the house organ of Precision Scientific Co., Chicago, is announced. This issue deals with the petroleum industry exclusively.

* * *

Pump Builders Expand

New administration and factory buildings of Pacific Pump Works were officially opened and occupied recently. Factory buildings, of the conventional saw tooth construction are modern in every respect. New equipment will enable plant production to keep pace with sales, it is said.

* * *

New Flocontrol Valve

The Hancock Valve Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., announce a completely redesigned line of Hancock Bronze Flocontrol Valves. These are in reality a combination flow instrument and shutoff valve.

This new line of Flocontrol valves retains the basic

proportional flow or straight-line flow characteristic of the original valve. Stainless steel valve seats and discs of 500 Brinell hardness are made on diamond boring machines. It is claimed that these new hard valve seats and discs will smash nails, pipe turnings, welding chips and boiler scale without leaving a trace on either seat or disc.

An illustrated bulletin is just off the press giving full particulars of design, materials and applications.

* * *

Welding Electrode Holder

The need for an electrode holder that would combine light weight with maximum conductivity, would be easy to handle, and small enough to be successfully manipulated in tight places is said to be met by a new type of holder just introduced by the Jackson Electrode Holder Co., Detroit.

* * *

Controllers

Temperature recorders and controllers for furnaces are described in new Bulletin No. 462 published by The Bristol Co., Waterbury, Conn.

* * *

Fairbanks-Morse Pumps Used

Five completely Fairbanks-Morse equipped pumping stations are employed by Crude Oil Pipe Line Co. in its 78-mile, 5½-inch line from Loma Novia field in Duval county, Texas, to the company's deep-water terminal at Corpus Christi. Two of the stations are new, being added to increase the line capacity from 6000 to 9500 barrels per day.

* * *

Transite Pipe

A new illustrated 32-page book, entitled "Transite Pressure Pipe," Form TR-11A, has been published recently by Johns-Manville, 22 East 40th St., New York.

* * *

Steam Traps

Armstrong Machine Works, Three Rivers, Mich., announces a new bulletin entitled Automatic Drainage for Natural Gas Pipe Lines, which tells who uses Armstrong traps and why. The bulletin also describes how the trap works and tabulates data of types and sizes available.

* * *

A. T. Donley, formerly with Allegheny Steel Co., has joined the sales organization of the A. M. Byers Co., Pittsburgh. He will be located in St. Louis where he will be in charge of tubular steel sales to the petroleum industry.

* * *

Turbine Pumps

Recent appointment of zone representatives for Roots-Connersville Blower Corp., Connersville, Ind., have been announced by J. B. Trotman, manager turbine pump division.

Carl B. Sunderland, Muncie, Ind., is covering Indiana, Ohio, Michigan, Illinois, and Kentucky; J. J. Heinrikson, Kansas City, has western Missouri, Kansas, Nebraska, and part of Iowa; and P. C. Rowe, Newark, N. J., has northern New Jersey.

* * *

Instrument Service

Mason-Neilan Regulator Co. announces the opening of a branch in Los Angeles with improved facilities for complete service including stocks for immediate shipment, servicing facilities for regulators, instruments, valves assembly and calibration of thermal systems.

* * *

Portable Brinell Instrument

A light-weight, portable Brinell instrument is announced by Teleweld, Inc., Railway Exchange Bldg., Chicago. It is said to eliminate both the necessity of dismantling equipment to be tested and transporting specimens to the laboratory.

Known as the Telebrineller, the instrument was developed by a large railroad rail maintenance organization. A number of oil refineries are said to be employing it to test parent metal adjacent to welded joints in alloysteel pipe in high pressure and hot oil lines, heat exchangers, castings and other equipment.

The outfit is composed of the instrument proper, a bar of known hardness, a microscope with a scale etched in its focal plane and a slide rule, packed with extra test bars and impression balls in a case.

* * *

Proportioning Control

The Wheelco Instrument Co., Chicago, is announcing a new "Proportioning Capacitrol" consisting of an electrical device mounted integral with an indicating pyrometer. It is designed to control fuel fired or electric heating units which cannot be successfully controlled by the simple 2-position or 3-position type of controller.

* * *

Time Recorder

A new time recorder, or "time-clock", the Uni-Speed is offered by Stromberg Electric Co., 223 W. Erie St., Chicago. One-hand operation is its feature. The recorder is fully automatic and tardy registrations are printed in red.

* * *

Hard-Facing Booklet

A revised edition of the booklet, "Haynes Stellite Products in the Oil Fields" has been published by Haynes Stellite Co., Kokomo, Ind.

* * *

Book Catalog

Chemical Publishing Co., New York, announces Catalog No. 5, a 136-page spiral wire bound booklet listing technical books. It is available at 10 cents.

INDEX TO ADVERTISERS

Refining Technology Section

(See also page 56)

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions

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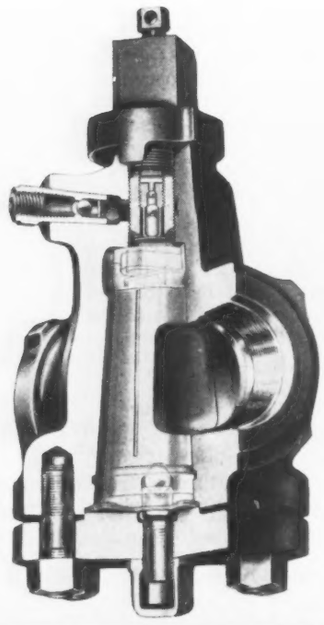
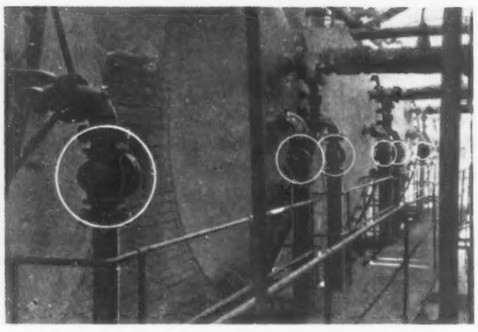
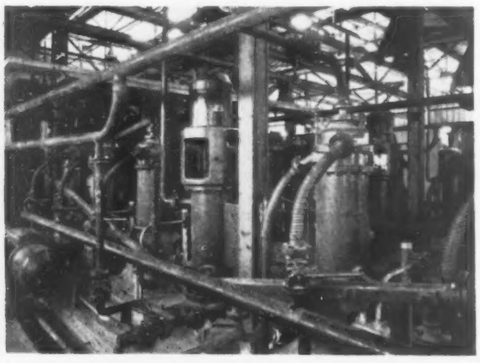


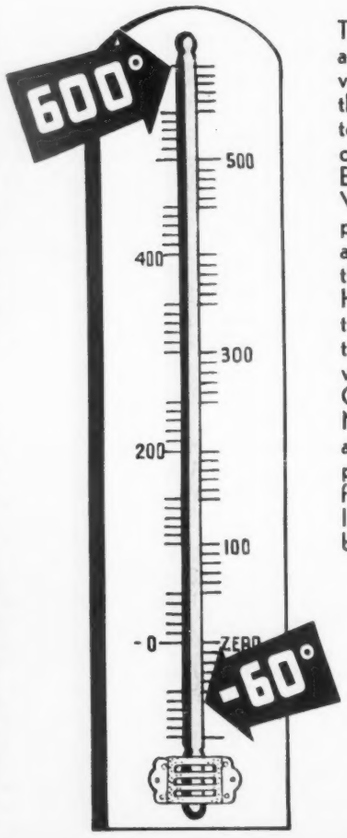
MODERN REFINERIES DEPEND ON NORDSTROMS TO SAFELY HANDLE EXTREME TEMPERATURES



Nordstrom high-pressure valves on hot oil transfer lines at a Southern California refinery.



One of California's newest and most modern refineries is equipped with both Nordstrom Hypreseal and Standard type valves.



The most advanced methods of refining are actually chemical processes. The various solvent processes require valves that will NOT leak internally or externally, will handle the widest range of temperatures and resist corrosion. Ever since their inception Nordstrom Valves have been the choice in practically every chemical plant. They are specified for solvent processes in the refining industry. The Nordstrom Hypreseal Valve is particularly essential on lines carrying extreme temperatures from —60° to 600° F., made of various approved metals including Chrome Nickel, Bronze, semi-steel, Nordco Steel, Meehanite, Aluminum and Mercoloy. A special non-soluble plastic lubricant has been developed for service in these valves on solvent lines. Also special alloys that prevent brittleness in extra low temperatures.

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Nordstrom valves offer . . .

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Metals—special alloys for specific services

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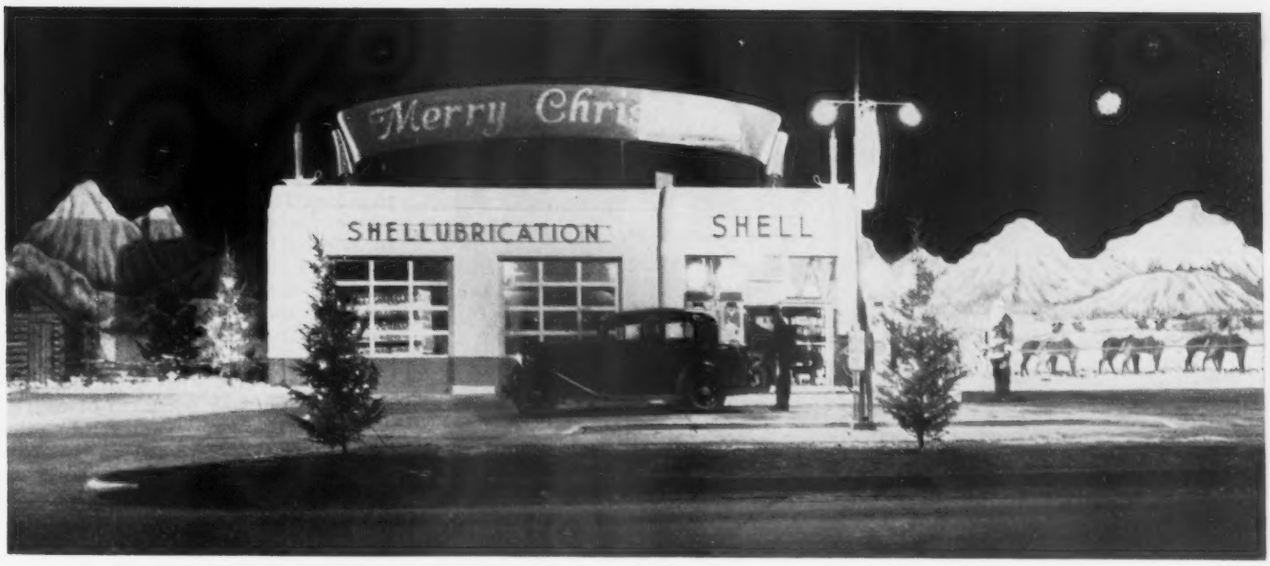

Santa Claus and elaborate winter scene cut-outs border the drives of this Shell station, with a large "Merry Christmas" sign over the roof. The result is most effective

IN HOLIDAY GARB

More Stations Adopting the Practice Of Decorating for Christmas. Some Oil Companies Offer Prizes for Best Ideas as Worked Out by Dealers

By E. L. BARRINGER
N. P. N. Staff Writer

CHRISTMAS Holidays will find an increasing number of the normally unromantic oil industry service stations dropping the role of gasoline and accessory sellers to don the trappings of assistants to Santa Claus in keeping with the Holiday spirit.

Last year's decorations will be brought from storage and checked against further use this year, new decorative materials will be purchased, and in a few days stations all over the country will take on the traditional Holiday garb.

Decorating a station for Christmas involves consideration by the retailer of the type of building, the neighborhood and the amount of money available.

To stimulate interest in Christmas station decorating two major companies in the middle west again this year are offering awards for the best efforts of their dealers in this direction, Pure Oil Co. and Shell Petroleum Corp.

Shell is issuing a folder to its dealers, announcing the Holiday decorating contest, and offering suggestions on how stations can be decorated. The folder issued a year ago showed actual photographs of some stations, and gave details for making silhouette displays.

"Gaily decorated windows will warm the heart of many a motorist during the Holiday season," the folder announced. "It's not difficult . . . . just a few strands of decorative crepe paper, little cotton, a tree and a few lights. That's all it takes to make a window that will gleam out warmly and incidentally help move some of the accessories or specialties that have probably been packed away."

Pure Oil announced its Christmas contest in the current issue of the Pure Globe, along with the company's suggested Holiday window trim, and a photograph of last year's contest winner.

"The results of last year's contest were particularly gratifying in that several letters were received from dealers who for the first time had decorated their stations," the announcement story in the Globe related.

"In each case a statement was made to the effect that a definite amount of new business and a definite increase in gallonage was directly attributed to the dressed up station.

"One dealer, Don Kantner in Maywood, Ill., reported that his daily gallonage jumped an average of 50 gallons per day while the decorations were up. Much of the new business, said Mr. Kantner, was retained as regular business.

"Others reported their results in equally glowing terms. So it can readily be seen that, contest or no contest, the decorations idea is a worth while one."

A FUNDAMENTAL to be considered before getting into the details of decorating, an oil company advertising executive pointed out, is whether the station is going to be active in selling to the Christmas trade.

If the station plans to sell accessories, radios, electrical appliances and other merchandise for gifts then the general decorative scheme should be pointed towards the merchandise displays. If the station is not planning an active gift campaign then decorations can be arranged purely as decorations without any idea of keeping attention focused on selling displays.

Many materials are available for decorating stations, such as Christmas trees, wreaths, lights, decorative paper and silhouettes. Because most station decorations are outdoors the more durable materials are in favor.

Lay-outs of station buildings, the

Note the star at the corner of the roof and on the gables of this Pure Oil station, operated by D. R. Scragg, Huntington, W. Va.

drives and borders of drives offer a variety of decorating opportunities. There are many spots for Christmas trees, such as the ends of gasoline pump islands, the borders of drives, and in front of the building or on the ledges at the pillars between doors to the lubrication department. Building roofs also are available for decoration, and are excellent spot for silhouettes.

Since lighting is essential to a station there are many outlets, on the islands and around the building, so strings of colored lights covered with evergreen branches can be extensively used.

Incidentally, the island floodlights offer decorative opportunities and one jobber several years ago used the floodlights to bring to an end opposition to the station from members of a church across the street.

These church members had long protested the proximity of the station. On the first Christmas the station was open the church as usual put up elaborate decorations. As soon as the decorations were in place the jobber climbed the floodlight pole and adjusted the light to shine squarely on the church front, thus setting off the decorations. That night the lights came on, flooding the church front in light, and church members never again grumbled about the station across the street.

Station decorations of course should be in keeping with the general trend of Christmas observance of the particular community, advertising people caution. Some cities are noted for the Christmas decorations, outdoors, the homes and business places. In other cities the outdoor decorating idea has not taken root.

This leads to a point from one oil company executive to the station operator, that being to keep in mind the competitive situation from other business houses. It is one thing, the executive pointed out, for a neighborhood station to place a well-shaped tree out in front, or in a corner of the drive, tastily decorated just to show some Christmas spirit and give the station additional color. And it is another thing for a station to make a big splurge, that may be big by itself, but not so noticeable when judged by what other business men do.

"Take the case of the big cities," the executive continued. "Department stores, hotels and other business establishments spend lots of money for Christmas decorations—and have a staff to design and build the decorations. Where does the station come off, even if lots of money is spent, against such competition?

"If you were taking some friend or relative out to see the Christmas sights would you stop at some service station or head for the department stores and hotels?"

By the same reasoning, the executive continued, the same amount of money spent in a smaller town may have more results than if spent in a city, keeping in mind the competitive situation. So the executive advised simple, tasty decorations for the station to show the Holiday spirit, and yet to keep away from too elaborate decorations to make a station compete with other merchants.

Some decorative materials must be bought each year, such as trees, but other items can be used year after year, such as strings of lights, electric candles and silhouettes. Some stations rearrange these permanent decorations each year to keep the decorative idea fresh. The last year's prize winner in one company contest features a cut-out of Santa Claus and his reindeers. The reindeers and sleigh one year are on the building roof, then they are moved. Last year they were climbing from the drive to the roof.

One executive also advised keeping decorations concentrated, rather than spread thinly if a good job of over-all decorating cannot be done. In other words, a corner of the drive, the building or the pump island might carry a better simple display than attempting to spread the same expenditure all over the building and lot. Attention of customers is focused on the one simple decoration.

The religious motif seems to be a debatable point. Some executives cautioned against a religious theme, advising instead to stay with lights, trees and Santa Claus, for fear of overlooking details that might offend some religious group. On the other hand some stations have featured a religious scene in the windows with considerable success.

Another Christmas idea, linked with the general scheme of decorations and also Christmas selling, is to have a Santa Claus in the station to greet the children. Department stores have long used the Santa Claus idea to attract customers to the toy departments and to let the children read off their lists for the benefit of parents. The idea has extra value in case the station has some toy among its Christmas trade items.

Whether or not a station is active in selling to the Christmas trade, executives are of the opinion that Holiday decorations pay, even if the decoration is simple and inexpensive. As one executive pointed out there is the psychological effect, on the customer and the salesmen, getting into the Holiday spirit—the customer is in a better buying mood and the salesmen absorb the spirit and do a better job of selling and servicing.

A lime solution spotted on the glass, the evergreen boughs over doorways and trimmings in the island display cabinet gave this Shell station of Fred E. Mitchell, Toledo, Ohio, a holiday atmosphere, at a very reasonable expenditure

To cash in

An Equiflux heater does more work than any other heater of equal tube surface that you can get

That means a smaller heater for a given job

It means faster heating of the oil, longer non-stop runs, maximum yields of gasoline—better Dubbscracking

Put in a Dubbscracking unit with Equiflux heater—now

Cash in on it when the big motoring season starts

It won't be long now

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

Selling Gift Merchandise At Service Stations

Window trim suggested to dealers by the Pure Oil Co. for 1937 Christmas selling. Items featured are heater, battery, defroster fan, gas tank cap, flashlight, household oil, shampoo, green soap, goggles, spark plugs, lamp bulbs, and sleet remover wiper blades. A four-page folder is sent to dealers giving all details for setting up the display

"TWENTY more shopping days until Christmas" will be the box on many newspaper front pages when you read this article—the annual daily reminder to everyone that the time is near to complete purchases for that Holiday so dear to the children, and well liked by all of us.

Christmas shopping at once brings to mind toys, handkerchiefs, gloves and hose for the ladies, and neckties for men; but there still is the annual mental struggle throughout the land to think of unique gifts—the present that will be different—before falling back on the old reliables.

With the automobile the most cherished possession of most families, gifts for the car, given to individuals or to the family group, offer opportunities for that unique present. And when the Christmas shopper begins thinking in terms of the automobile the oil industry's service stations, dominant outlet for automotive merchandise, now is taking its place among the Christmas trade marts.

For the service station the Christmas selling season arrives at a most opportune time. The rush of winter conditioning is over and there is the early winter lull pending the trek of motorists southward on winter vacations. So the first three weeks of December enable the retail outlets to concentrate on extra sales and profits from Christmas trade.

What can the service station offer for the Christmas selling season? The answer depends on what merchandise the particular station stocks. The larger the array of one-stop items the larger the list of Christmas goods.

As a starter the standbys of the station, gasoline, motor oil and lubrication, do not lend themselves to immediate Holiday selling. Yet, these lines may be on the deferred delivery list through the sale of coupon books. Several large oil companies in years past did a good volume on coupon books at Christmas, putting up the books in Holiday wrappers. Maybe coupon books would go over in your trade territory.

Marketers also are of the opinion that the staple line of accessories would hardly be fitting for the Holiday season. There might be some sales of items regarded strictly as replacement parts on the car, but marketers are inclined to advise pushing other accessories better adapted to the season. Again, coupon books might ultimately end up in some accessory business after Christmas in case the receiver cared to trade it out for accessories rather than petroleum products.

That brings the question of what a station can offer for Christmas selling up to the point of accessories, out of the replacement classification, and here the number and variety of available item is unlimited except by the station's stock.

The world seems full of radios yet, like babies and automobiles, a new crop arrives each year and there seems to be no end to the market. The 1938

☆ ☆ ☆ **A word from you will bring complete information regarding the many advantages of Furfural refining**

The Furfural refining units now in actual operation furnish convincing evidence of the definite advantages this process offers.

Let us bring you up to date with the latest cost records, laboratory reports, flow sheets and practical data.

The improved economy, flexibility and simplicity of operation which it offers will immediately be apparent.

Licensed by

TEXACO DEVELOPMENT CORPORATION

A SUBSIDIARY OF THE TEXAS CORPORATION

135 EAST 42nd STREET

NEW YORK, N. Y.

Last year Pure Oil Co. suggested this window trim to dealers for a Christmas display. Items featured are battery, anti-freeze, heater, coupon books, and the toy airplanes and tank truck

models are now on the market and magazines and newspapers bristle with radio advertising.

Radios, for Christmas station selling, are not limited to automobile models. The auto radio field is large in itself and most drivers consider a radio about as essential as a spare tire, but marketers in the radio business also sell home models. In the home radio field there are the floor and table models, and quite popular now and exceedingly suitable for gifts are the small bedroom models. The market for radios seems limited only by the number of rooms in the house, and cars in the garage.

GETTING back to the strictly automotive field there are the items for keeping car occupants warm during the winter. This field offers a number of interesting ideas. There are car heaters, getting into the more expensive lines, also defroster fans, and windshield defroster shields. For winter driving comfort there are gifts ranging from a few dollars up to around $20.

Another winter comfort item that might easily bé overlooked is automobile robes. For long distance winter driving, particularly for older folks, a robe is an appreciated present. Another item, closely related to car comfort, is a radiator winter front. Again there is a choice in price, from the inexpensive to the permanent metal fronts.

Automobile lights come and go but at the moment fog lights and spotlights are good sellers. Fog lights came in first along the eastern seaboard but more and more fog lights are now seen in midwestern states.

Flashlights also are perennial gifts, and no matter how many a family has there is always need for another; and a flashlight is a gift that appeals to the child, as well as to adults.

Automobile rear view mirrors, the type with a clock and the plain models, are suitable holiday merchandise.

One marketer suggested Christmas tree lights, the strings and also re placement bulbs. Santa Claus usually overlooks the lights until the last minute and then there is the scramble tc get out the old strings, to decide whether to get new ones, and to have a plentiful supply of replacement bulbs on hand.

Allied with tree lights are the trees themselves. Frequently there are so many places selling Christmas trees that the venture has considerable risk, yet some service stations have reaped a tidy sum selling trees where the display space was available and the manpower was there to handle trees and still pump gasoline.

The list above by no means is the limit of service station merchandise suitable for Christmas selling. The limit is set only by a station's inventory. Small stations may have only an item or two that could be featured in December. Somewhat larger stations might have a bigger inventory, getting into flashlights, winter fronts, car heaters and defrosters and so on. Still larger stations might get into bigger items such as bicycles, refrigerators, home radios and the various electrical appliances, if merchandise of this type is handled regularly at the station.

As one marketer put it, "the best index of what a station can sell for Christmas is for the operator to consider what he has in stock that he would like to receive as a gift, or better yet what he sells that would appeal to his wife. In other words the likes and dislikes of your wife or yourself will yield a Christmas selling list."

What To Sell

Following are items suitable for selling at service stations for the Christmas trade as discussed in the accompanying article:

Auto Radios	Spotlights
Home Radios	Flashlights
Car Heaters	Rear View Mirrors
Defroster Fans	Christmas Tree Lights
Auto Robes	Christmas Trees
Winter Fronts	
Fog Lights	

ANOTHER sales suggestion for Christmas merchandise coming from one marketer is to handle a special item to attract customers—a trade puller or leader sold at a price to enable the retailer to recover his cost plus a small profit. The item if for children should be a toy, if for the adults it should be practical.

Shell Petroleum Corp., for example, is offering another trade-puller item this year. Last year Shell wrapped a can of household oil, lighter fluid, and spot remover in a Christmas package. The combination deal, a 75-cent value, retailed at 49 cents.

This year Shell has another combination—a can of lighter fluid and a lighter, dressed up in a special Christmas wrapper, to retail at 44 cents. Such specials attract trade, and bring customers into the station.

While the Shell combination Christmas package is typical of what a station can offer to adults, a practical item, Pure Oil Co. for several years had inexpensive toys to appeal to the children. Just let a kid see a toy in a station window and the father will have a hard time pulling out without buying.

Pure Oil had two toys, both featured a year ago. One was an airplane with whirling propeller, retailing at 98 cents. The other was a tank truck, Pure name on the side, selling at 79 cents.

With the list of service station merchandise suitable for Christmas selling, and a good trade-puller item selected, comes the problem of how to merchandise to the Holiday trade.

The three merchandising aids recommended by marketers, are window displays, station signs, and personal selling.

Attention of the customer to the station as a place to buy gifts can be ob-

tained through the station signs and window displays. If the marketer wants to put on a more elaborate selling campaign outside advertising can be done through newspaper space, or direct mail pieces. Advertising off the station lot also could be done by diverting customary early December advertising off gasoline and accessories to the Holiday merchandise.

Window trims and station signs, however, can be obtained with a minimum of expenditure. Special curb signs, or banners that will last for the Holiday season can be purchased at small cost. Most stations put some kind of Christmas decorations in the windows anyways, so a few extra signs and decorations would not increase this cost materially.

Primary purpose of the curb signs or station banners is to acquaint motorists and pedestrians that such merchandise is on sale in the station. Service stations as a group have not pushed Christmas merchandise in former years, so the regular gasoline customer, as well as the passing motorist, must be attracted to come in to shop for Christmas.

Marketers recommend that window trims be exclusively on Christmas merchandise during the Holiday selling season. If space permits at least one of each item of Christmas merchandise should be placed in the window. When the window is first trimmed some one item should be featured, put in the most prominent spot so it will attract the customer's attention. Then every two or three days the featured merchandise can be changed. Thus each item of Holiday merchandise is brought up from the background, has its day or so in the spotlight and returns to the general background.

This rearrangement of merchandise keeps the window fresh. Actually the same items will be on display all through the Christmas selling season, but the rearrangement will give the window new appeal and keep the various items continually before the customer.

Keep Window Displays Fresh

• Christmas window displays can be kept fresh and interesting by frequent rearrangement of the merchandise. For several days one item can be prominent in the window. Then another item can be moved forward. By rotating these items each will have a day or so in the spotlight, attracting attention of the customers, and selling more merchandise.

Price tags on merchandise in the windows are also suggested. Marketers point out that bargain hunting does not cease even in Holiday buying. Also, that the service station operates on the one-price theory—does not fluctuate prices from week to week to move goods—and to the public mind the service station is not a place to "get a bargain." Outside of swanky "shoppes," display windows usually show prices, so price tags in the station windows will help make sales. If the price tag drives off a customer it saves that much time as the same customer would have walked out anyways when the price was given verbally.

The suggestions from marketers for displays are not confined to trims in the display cabinets or pump islands or windows of the station building. Arrangement of the station may provide space for displays in the lubrication room. If a considerable number of customers use the waiting room while their car is being lubricated, a display could be worked up for this room.

A sales idea strongly recommended by one marketer is not to overlook the possibilities of keeping Christmas merchandise out on the pump island, providing of course that weather permits and the station has sufficient manpower around to keep an eye on the merchandise. If the merchandise is on sale on the pump island the window trims can be used to support the pump island counter.

In the actual selling, after customers have been brought in by the signs, window trims and trade-puller item, marketers point out that fresh ideas can be put to work. In personal selling throughout the year the salesman is talking in terms of the buyer putting the merchandise on his own car and why it will be to the benefit of the buyer to make the purchase. With Christmas selling, however, the salesman will be thinking in different terms —of the customer's buying mood in selecting a gift and not a replacement accessory for his own use.

Here is a window trim for Christmas worked out by Otto Schatz, Muskegon Heights, Mich., a Shell Petroleum Corp. dealer

One Jobber's Holiday Sales Program

The Milton Oil Co., independent jobbing company with headquarters in Sedalia, Mo., for the past two or three years has carried on a Holiday merchandising program at its service stations in which selected items of its line of automotive merchandise as gifts are featured. Ray Lippard, sales promotion manager, says the company will follow the same plan this year.

The company handles its promotion of this sales program inexpensively by securing standard forms for Christmas letterheads, in a variety of designs, such as can be secured from any lithograph house. These forms are in bright colors and have a border of red and holly leaves and all show Santa Claus, or some typical Christmas scene, but still leave plenty of space for a letter or other message.

Through its own duplicating department, the company works out a message for the Christmas letterhead, which can then be used as the center of a window display at a station. Following are a few of the announcements of this nature the company has worked out:

"Yuletide brings Santa Claus, also wintry blasts and biting blizzards. Let Santa Claus deliver you a Winter Front, to protect you from the biting blizzards and wintry blasts."

"Christmas Comfort and Christmas Cheer. A De Luxe Heater and you have these throughout the year."

"Make it a Dixcel Coupon Book Christmas. Anybody can use it and anybody will appreciate it. Put a Dixcel coupon book in his sock and see him step on the gas with Christmas Joy."

"Auto-Lite Battery—The Ideal Gift. Practicable and Serviceable! A Christmast Remembrance that will last throughout the year."

"A Star Guided the Wise Men. If you are a wise man you will have a flashlight to guide you. Give Him a Flashlight."

"Why not a Christmas Gift for Your Car? A case of Hyvis, Milt-O-Penn, or Dixcel will make your motor sing Christmas Carols."

Holiday Gift Sale Must Be Staged

By DICK DAY

TEN or 15 years ago few service stations carried merchandise other than "gas" and oil. People bought tires from rubber companies, spark plugs from accessory stores and batteries from battery shops. The business of supplying motoring needs was specialized. Car drivers were required to make several stops when the car needed attention.

The customer objected. He demanded one-stop stations where all this work could be handled under one roof. Each year now new types of merchandise have been added to service station inventories, items easily installed by comparatively unskilled attendants, until now some oil companies include household and non-automotive items in their supply of service station wares.

Included in the offerings of more than one successful modern service station are electric clocks, home radios, electric toasters and mixers, washing machines and electric refrigerators.

These items have been added because it has been found that people will buy them from service stations, where their parking problem has been solved and shopping is a simple matter.

Christmas season is the hey-day of every manufacturer whose products are consumed by the public. Christmas gifts have been known to include such items as a new roof for the barn, a new dog house for Fido and a pair of white canvas gloves for a motorman.

There is a Holiday demand for much of the merchandise the service station carries if the station can bring it to the attention of its customers as appropriate for a Christmas gift.

What more would a man ask from Santa Claus than a new set of badly needed tires, a heater, new battery, car radio, or some such item?

One Christmas Eve a woman paid for two tires at her favorite service station and asked that they be delivered to her home the following morning.

"My husband works nights," she said, "and would see the tires if I put them under the Xmas tree tonight. If you'll deliver them in the morning they will be more 'Christmasy' and a complete surprise to him."

Arthur Render, accessory salesman for Standard Oil of Ohio was interviewed on the trend toward the buying of service station merchandise for gifts.

"For the past three or four years," said Render, "we have decorated some of our stations with Christmas colors, trees, and so on, making a real bid for Christmas business. Coupon books, oil filters, auto and furniture polish and polishing cloths were put in special wrappers and displayed in island stores and show windows. Small Christmas trees, tinsel, holly, stars and icycles were used to decorate these displays and the stations themselves in order to tie-in with the Holiday buying season."

"Did people walk up to a bottle of auto polish, for instance, and say, "Oh my, what a lovely gift that will make" or did your station men exert extra pressure to sell the Christmas items/" Render was asked.

"Neither," replied Render. "The station men employed little if any extra effort in arousing interest. It was found that customers would comment on the decorations or compliment the attendant on the appearance of a show window or island display, thus paving the way to a suggestion by the station man that the purchase of a gift might be in order."

"The result of this effort was quite satisfactory," he continued. "In the average case the extra sales would pay for the cost of the displays and decorations and perhaps a 20 per cent profit to boot. The cost was kept low and in every case was on the under side of $10."

Render pointed out that Sohio stations now handle a much more complete line of accessory merchandise.

"In my opinion," he said, "any station handling such items as car radios, heaters, defroster fans or auto clocks could easily show a neat profit on a small investment in display material and decorations for the Christmas season. Particularly would this be true where a budget or lay-away plan is available."

Render was asked, "In previous years whom have you found to be your best Christmas gift customers, men or women?"

"Decidedly women," he replied, "one reason being that women are in less of a hurry as a rule and are more observant of displays and decorations. Also they are appreciative and more willing to comment."

The point was brought up that different appeals might be used with men than with women.

"To a woman," said Render, "the station man can say in effect, avoid selecting a necktie that your husband may not like—buy accessories that you *know* he'll appreciate. To a man he can say, save time—select a gift—we will wrap, enclose a greeting card and mail for you."

Replying to a question regarding the extent of his company's plans for a Christmas tieup this year, Render had this to say.

"This year my office plans to feature certain accessory items as Christmas gifts in some stations. As before we will decorate the stations in Holiday style. Displays will be placed in show windows and island stores featuring these suggested gifts. We plan to wrap packages for customers in tissue paper and bright ribbons. Also our tires will be wrapped in special Christmas-color paper. The salesmen will be reminded of the extra commission possibilities of the plan."

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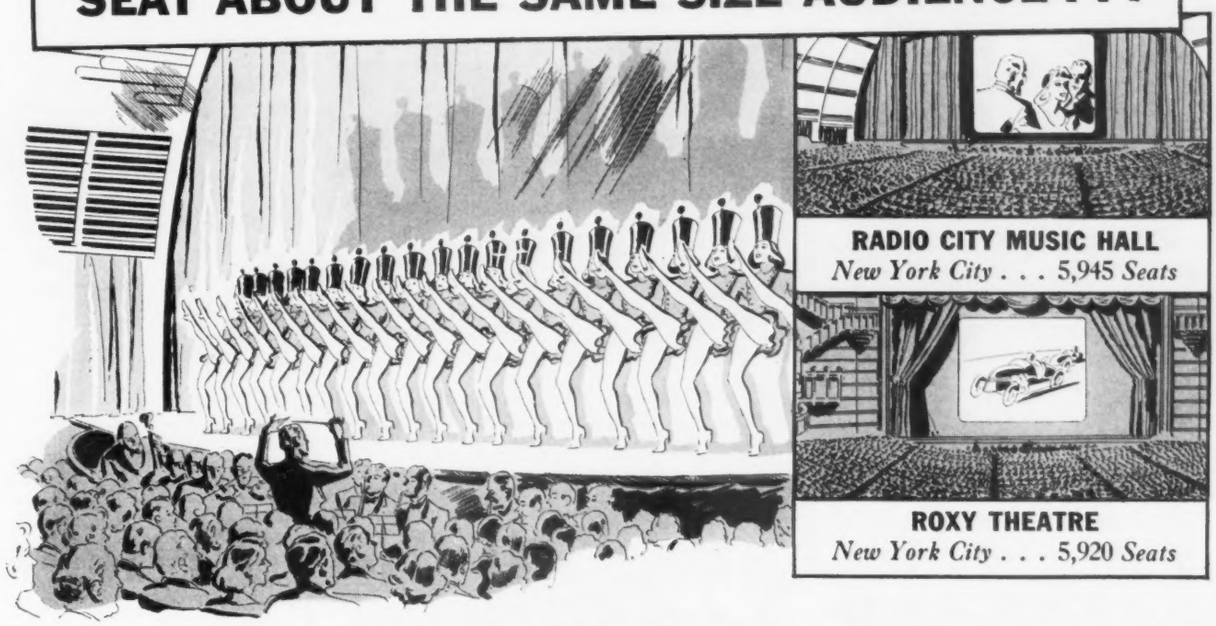

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"The National Magazine with Local Influence"

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Striking use has been made, as a background, of the wall of an adjoining building at the new station, in Rochester, N. Y., of the Goodyear-Wende Oil Corp., with headquarters in Buffalo. The station's modern lubrication facilities are prominently displayed

Two Lifts and Pit for Trucks In New Rochester Station

CAR lubrication facilities are emphasized in the new service station of the Goodyear-Wende Oil Corp., of Buffalo, recently opened in Rochester, the latest addition to the chain of 44 stations now operated by the company in the two cities.

The new station is at State and Allen streets, close to the downtown shopping district and on a direct route to Lake Ontario.

The station has three lubrication bays, with its slogan, "Certified Lubrication" prominently displayed over the doorway. There is provided a roll-on-lift, a free wheel lift and also a concrete pit for servicing trucks. A centralized high pressure lubricating system is installed with overhead swivels at each lift and high pressure hose assemblies in the pit. A fourth bay is equipped with car washing facilities.

The following program is used in selling and advertising the lubrication service offered by the station.

1—Advertising of the car and truck lubrication service is done by window displays and by product displays.

2—A card is mailed to each new lubrication customer promptly, thanking him for bringing his car to the station to be serviced.

3—A follow-up system is used to bring to customers' attention the need for another lubrication job and notice is given the customer regularly.

4—Prospects for truck lubrication accounts are spotted by company salesmen and sales literature is sent them, calling their attention to the greasing facilities at the station.

5—Neighborhood solicitation is made by the station manager for lubrication business and personal solicitation is made on truck accounts whose business is being sought, and they are asked to try out for themselves the thoroughness of the station's services and the quality of its products.

The site of the new Rochester station is approximately 129 by 206 feet, rectangular in shape. The building, 80 x 52 feet in size, is modernistic in architecture and equipped with the most up to date equipment. The building walls are structural and rolled steel sections, with the exterior of the entire building covered by white porcelain enamel panels, the inside of which is covered with a cast mineral insulation capable of resisting a temperature of 2200° F.

The roof construction is 22 gauge steel deck supported by bar joists. Over the steel deck two layers of ¾ inch insulation board were laid and covered with four-ply built up roofing paper. The interior of all walls and ceilings is plaster on metal lath. The floor plan is L shaped with a hexagonal office in the center and lubricating bays on each wing of the building. The hexagonal office is approximately 16 feet from the front to the rear walls in which is installed glass show cases for merchandising accessories. From the office a door leads to the 17 x 12 foot sales and waiting room furnished with modernistic chromium steel furniture.

The toilet rooms have tiled floors and tiled wainscoting. In addition there is a toilet and dressing room for the station personnel equipped with individual clothes lockers. A store room connects the two lubricating sections of the building, in which the air compressor and battery charger are installed, together with steel shelving for storing oil and accessories.

The entire building is steam heated with blower heating units in the greasing bays, office and waiting room. Wall radiators heat the toilet rooms. The boiler is heated with an oil burner.

The station driveway is asphaltic concrete with concrete approaches and ramps, and driveway facilities consist of five individual two-pump islands installed with computing pumps which draw from two batteries of four 1000-gallon underground tanks. Three air towers are located well clear of the gasoline pumps. A parking area provides storage for 30 cars.

Nine 1000 watt floodlights and three 300 watt pump island lights provide ample illumination at night. The wall of the adjoining building at the rear of the service station, which is 52 feet in height and 202 feet long, provides space for a large advertising sign.

This station is the eighth company service station to be erected by the Goodyear-Wendle Oil Corp. since the company took over Texaco distribution in Rochester in April 1936.

Dog-Eared, Coverless N.P.N. Is Balo's Best Sales Tool

By JOHN W. THOMPSON
N. P. N. Staff Writer

Charlie Balo's New Car Lubrication Issue of NATIONAL PETROLEUM NEWS, after a few months of intensive usage. Coverless, dog-eared, and grease smeared, Balo says it was instrumental in boosting his lubrication business and in getting the confidence of his customers

Charles M. Balo, a Sunoco dealer, is head man at the Manor Park Service Station, Lakewood, Ohio

CHARLIE BALO says its just good business to check the tires on the neighborhood kids' bicycles when they roll in for air, and that should give you some idea of the kind of a fellow Balo is and why he is making a success of his Manor Park Service Station in Lakewood, the western suburb of Cleveland.

Paying attention to the needs of the kids in his community, and knowing the names of his customers as he greets them on the drive, has made Charlie Balo an accepted member of his neighborhood. As you might expect, Charlie and his helpers never walk to a customer's car, they run. Whenever a car drives into the station one of these boys makes it a point to get to that car before the wheels stop turning, to acknowledge the visit and to find out the customer's needs.

But NATIONAL PETROLEUM NEWS has a selfish interest in talking about Balo. It was early in 1937 when the writer first drove into his station. Shooting some quick glances about in search of a story, we happened to catch a glimpse of a copy of NATIONAL PETROLEUM NEWS on his desk. A little closer scrutiny disclosed it was a copy of its Jan. 13, 1937, New Car Lubrication number, in which was contained the complete information and stories on the lubrication of the 1937 automobiles.

This copy was dog-eared, coverless and generously thumbed with grease and oil spots — evidence of having been put to considerable use.

Sensing a story, we asked Balo 'how come' this particular issue showed such conclusive proof of being manhandled. With that, he unfolded a nice tribute to this New Car Lubrication Issue of NATIONAL PETROLEUM NEWS.

First, he emphasized that this particular issue was the best sales tool he had around the station for selling lubrication jobs. He even went so far as to credit this dog-eared and shop-worn copy of N. P. N. with being the principal reason for an approximately 100 per cent increase in his lubrication jobs.

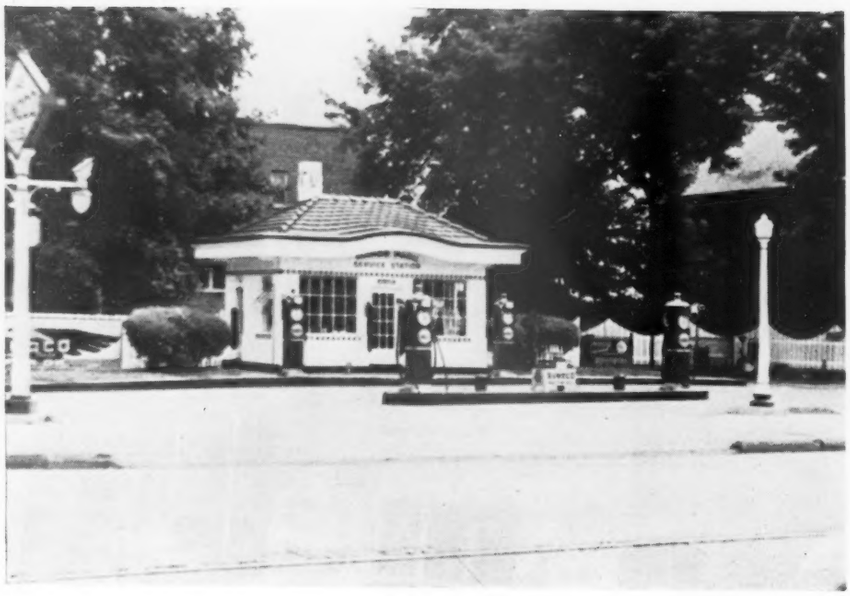
This issue, according to Balo, had helped him to sell more grease jobs because he studied it and was able to tell his customers so much about the lubrication requirements of their own cars that they placed complete confidence in his ability to service the cars properly.

Balo said that many of his customers read this copy of NATIONAL PETROLEUM NEWS while waiting for their cars to be lubricated and one in particular, who was about to buy a new car, took the issue home with him over night to read it through, so as to be in a better position to make up his mind on the choice of a car.

Balo said he had been using the issue to explain to his customers the details of hypoid gear lubrication, compression ratios, and many little-known-about points of lubrication. The copy was especially helpful, he said, in building up confidence in his service among new car owners, by showing them that he had the facts on the proper method of servicing each of the new cars.

This New Car Lubrication Number of N. P. N. has also enabled Balo to get better acquainted with his customers, by giving him information which he could use to advantage in conversing with them about their new cars.

In his well-equipped and spotlessly



Manor Park Service Station, Lakewood, Ohio, where Charlie Balo increased his lubrication business 100 per cent, largely, he says, through the helpful facts he found in the New Car Lubrication Issue of NATIONAL PETROLEUM NEWS

clean station, Charlie Balo sells about 1200 to 1300 quarts of oil per month, in quart bottles. His lubrication jobs average between 140 and 180 per month, and he pumps approximately 700 gallons of gasoline per day, with the average gasoline sale running about 6 gallons per customer.

We like to feel that Balo's success with the 1937 New Car Lubrication Issue of N. P. N. was not so much that he was a subscriber and received this copy; but that he was smart enough to put to use the many practical features which this issue each year includes. There are undoubtedly many other Balos who have found they can translate this stellar N. P. N. issue into more cash sales, just as this one did.

1938 NEW CAR LUBRICATION ISSUE

● This is the first official announcement of the annual Automotive Lubrication Number of NATIONAL PETROLEUM NEWS, which will contain the detailed servicing instructions of all the new models, among other features — YET many hundred orders for extra copies are already on file in its Cleveland office.

Over 5000 extra copies of the 1937 issue were ordered in advance of its publication, yet this issue a year ago was exhausted literally before it was printed, and twice reprints of its editorial contents were published to satisfy demands from readers.

With new editorial features and profusely illustrated, the 1938 New Car Lubrication Number, to be published Jan. 12, will be the most eagerly looked forward to of any issue NATIONAL PETROLEUM NEWS has ever published.

To be sure *your* demand for extra copies is promptly filled, send your order at once, for single copies or in lots, with remittance attached, to NATIONAL PETROLEUM NEWS, 1213 West Third St., Cleveland. Price schedule on this issue is given below:

Single copy	35 cents each postpaid
10 to 100 copies	25 cents each postpaid
100 to 500 copies	23 cents each postpaid
500 to 1000 copies	21 cents each postpaid
1000 and over	20 cents each postpaid

Copies will be mailed in bulk to any address in the U. S., or to individual addresses furnished by the purchaser.

5% discount on quantities of two or more, if check accompanies order. Cash must accompany orders for less than 10 copies.

Gasoline Tonic's Ads Are Cited By FTC

WASHINGTON, Nov. 29.—Holding that Nelson E. Woolman and Lyle G. Jackson, trading as Power Seal Co., Los Angeles, have made certain "false and misleading representations concerning the merits of Power Seal, a preparation sold in pellet form for use in internal combustion engines," the Federal Trade Commission has issued a cease and desist order prohibiting them from:

"Representing in advertising matter, radio broadcasts, or otherwise, that the use of their product in internal combustion engines will restore compression, completely rejuvenate tired and sluggish motors, seal leaky and pitted valves and reseat them, restore efficiency to ill-conditioned engines, effect savings in oil and gas consumption, or increase the power, speed or mileage of the engines."

Diesels Popular in England

WASHINGTON—Growing popularity of diesel power in England is reflected by a report to the Commerce Department from its London office. The report said that there are 12,500 public service buses operating in that country now, compared with 2400 in operation three years ago. The report said further that of the total number of new passenger vehicles registered in England this year, 69 per cent were equipped with diesel motors.

Oil Purchasing Company

WASHINGTON — A number of Swedish shipowners, owning 35 or more motor-driven passenger and cargo vessels calling at almost every principal port in the world, have formed an oil purchasing company which will buy and store all fuel oils used by the vessels, according to a report reaching the Department of Commerce here. The new company will have a capital stock of approximately $600,000, and will construct an oil depot at Goteborg, Sweden, shortly, the report said.

Motor Fuel From Wood

WASHINGTON, Nov. 29.—Extraction of liquid fuels from wood on a commercial scale is to be started in Sweden upon completion of a factory now being constructed, according to a report to the Commerce Department from Consul William W. Corcoran, Goteborg, Sweden.

It is said that the Swedish Engineers' Scientific Academy has been experimenting for 10 years in search of a method of taking liquid fuel from wood economically.

Take the "Hocus-Pocus" Out of Oil Heating

Widest Expansion of This Market Depends On Eliminating the Confusion as to Burners and The Fuels They Use Now Experienced By The Householder.

By MILTON A. POWERS*

(Presented Before National Oil Marketers Assn. Convention, Chicago, Oct. 12-14)

IN ORDER to obtain a clear understanding of the existing fuel oil specifications for automatic home heating purposes, it is desirable to look backward in our still young industry. In the beginning—which for all practical purposes may be placed about the year 1920—we find relatively few manufacturers building and selling equipment of varying types. Except by special arrangement between the burner manufacturer and the oil man, little or no care was given to supplying a carefully controlled fuel to the comparatively few owners of home heating equipment.

Each of the pioneer manufacturers was thoroughly convinced of the advantages of automatic heating with oil. In time a considerable number of hardy homeowners were duly infected —after continual exposure to their arguments. Fortunately for both parties, the burners sometimes operated for sufficiently long periods between service requirements to substantiate the sellers' claims to some degree. The owner in turn obtained a taste of the joys of carefree automatic heating. Having been so initiated, he became a loyal supporter and henceforth willing to undergo any explanable hardship—much in the same manner as the early automobile owner who started away from home with the adventuring spirit of the pioneer, knowing not what lay before his return.

The oil refiner in those days was not seriously concerned with the needs of the infant burner industry. The demand for domestic fuel oil, while increasing each year, was relatively unimportant in volume and hardly warranted more than passing consideration. While numerous "cuts" of oil were available and sold under a wide range of descriptive names for various industrial purposes, no special grades were refined for home heating use. All in turn were considered by-products in production of the all important gasoline.

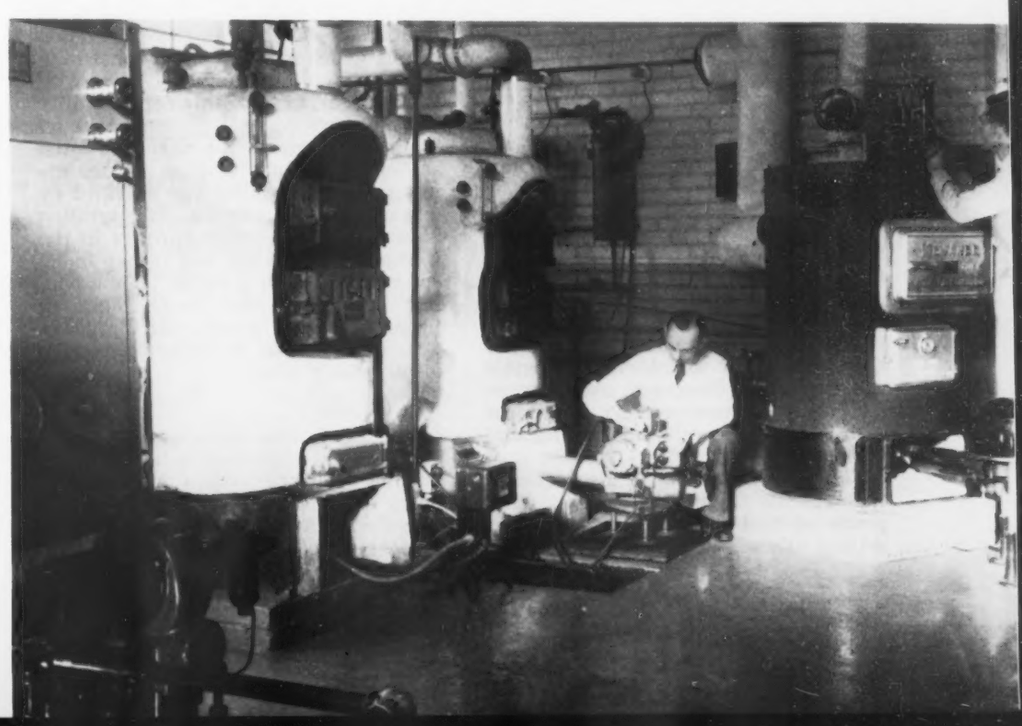
The burner man in this period knew very little about the technical specifications necessary to provide an oil suited for his equipment. He soon began to formulate definite opinions as to what he wanted, but by necessity was in the position of having to use what was already available, with the single alternative of specifying kerosine at a higher price.

As the burner business grew and manufacturers who had started with local distribution of their products began to obtain outlets in widely separated parts of the country, real need arose for better identification of suitable oils. The multitude of descriptive names for the different oils, while possibly well established in any particular locality, were often found to vary greatly from place to place. There were many instances where the same descriptive name, "Diesel Oil" for example, referred to distinctly differing products, in distant parts of the country.

It was at this stage of the development that the Underwriters Laboratories established minimum standards for burner design and construction and demanded an oil classification of better general understanding. This resulted in the now obsolete procedure of identifying oils by their gravity ranges expressed in degrees Beaume; —for example, 28 to 32 degrees Beaume; 32 to 36 degrees; and so on. While we now recognize this as crude and inaccurate it was a step in the right direction, and a more strict specification, even had it been possible, would undoubtedly have been ignored by most of the producers at that time.

It was not long, however, before the homeowner came to realize that some oils, in the 28 to 32 degree Beaume classification, for example, operated satisfactorily in his burner while others similarly identified did not. As to the reasons for these discrepancies, the homeowner knew nothing, the burner designer but little more, while the oil man if he did know, wouldn't tell. The owner, incidentally, soon reached the conclusion that when he had a good oil it was best to continue buying from the same source—a principle, even at this late date meriting attention.

With the rapid increase in the sales of burners, assisted every now and then by coal strikes and the lethargy



*Chief engineer, Timken Silent Automatic Division, The Timken-Detroit Axle Co., Detroit, and chairman of Technical Committee E on Burner Fuel Oils of Committee D-2, American Society for Testing Materials.

Save Confusion for the Householder

A reduction in the number of grades of fuel oil now offered for home heating will not only result in a direct and practical saving to the oil industry; but will also prove an advantageous sales argument with the householder, in widening the use of oil for heating, the author of the accompanying article points out.

The coal, stoker salesman tells the householder, it is pointed out, that a supply of stoker coal is available at so much per ton. He does not tell of all the various grades of stoker coal and their relative advantages, or that the furnace will only burn some of them. Similarly, the gas company talks of a single grade of fuel, with the double advantage of automatic delivery and payment after use.

"In contrast," states Powers, "the oil burner salesman deluges the prospect with claims, counterclaims, and endless debate on the mechanical advantages of various burners, what oils they will handle, relative heat values, what they cost and so on.

"All the while the prospect becomes more confused, his confidence in oil as a fuel is shaken and likely as not he finally decides against it."

of competing fuels, some of the oil companies began to give serious attention to the possibilities of their domestic fuel oil sales. The period from 1925 to 1930 saw several large oil companies pioneering in the now popular pastime of distributing burners as a means of increasing fuel oil volume. As the market grew they supplied it with relatively high quality fuels advertised under the refiners' own trade name. This oil was generally very satisfactory, being kept well above the minimum specifications of the burners for which it was intended. However, as smaller vendors entered the market with but hazy ideas of what was needed,—further complicated by haphazard purchase from whosoever quoted lowest at the moment,—an urgent demand arose for more specific standards to control the handling and burning characteristics of oil fuels.

During the year 1928 and at the instigation of what is now Oil Burner Institute, assisted by The American Society for Testing Materials, Underwriters Laboratories, and most members of both the burner and oil industries,—a group of tentative specifications was formulated. Early in 1929 these were accepted by both industries thru sponsorship by the Division of Trade Practices of the U. S. Bureau of Standards.

Fuel Oil Requirements

Now, for the first time, oils were identified by numbered grades, each formulated for a definite use with specific qualifications limiting its characteristics. Grades No. 1 to No. 3 inclusive were intended for domestic heating purposes, while grades No. 4 to No. 6 ranged from a light industrial fuel to the equivalent of Bunker C for units having preheaters. This same grouping has been maintained up to the present time, although revisions have been made at intervals to better suit the oil to economical manufacture and reliable combustion concurrent with advances in refining practice and burner design.

Time will not permit a discussion of the specific requirements for each grade of fuel oil or the reasons for setting them at their established points. Rather, we shall consider briefly how each affects the quality of the oil and makes its contribution to reliable burner operation. Furthermore, as we are particularly interested in home heating, no time will be given to grades No. 4 to No. 6, which are limited both by definition and accepted practice to commercial and industrial use.

Flashpoint:

Minimum flashpoints are specified in accordance with commonly accepted practice and existing laws to minimize the hazards of handling and storage. With present-day burners there is no need whatever insofar as ignition or combustion is concerned, for the oil to approach the prescribed minimums. Such minimum does, however, serve as a check against inadvertent mixing with lighter products in handling.

The maximum flashpoint is intended to provide an oil which will be lighted with comparative ease by the usual high voltage spark or arc, now used almost universally in preference to the older form of gas pilot light. The fact that a high tension spark with its limited heat producing ability has replaced the more powerful expanding gas pilot is due both to improvements in ignition design and to the production of oils which can be ignited consistently with minimum effort.

At an earlier date this dependability was not assured as variation in the oil from one dump to the next was often sufficient to cause ignition failure unless plenty of reserve was provided by a gas pilot. However, this ignition ability does not reside entirely in the flashpoint of the oil, but rather in its combination with a series of low boiling point fractions which help to propagate the combustion process. This fact leads us to the next criterion of oil quality which is

Distillation:

The distillation curve of an oil presents a most important indicator of its burning characteristics. Combustion in every form of burner follows progressive distillation of the oil particles during the process. It is evident, therefore, that an oil which is made up of a series of fractions, each boiling at a somewhat higher temperature will make for steady combustion with a minimum of noise and flame fluctuation. Furthermore, the presence of ten per cent of a relatively volatile fraction called for in numbers 1 and 2 oil aids easy ignition and rapid vaporization at low starting temperatures. The release of heat from this portion of the oil serves to vaporize the next higher fraction and so on, quite like the progressive upsetting of a row of dominoes, until the last bit of heaviest oil has done its part.

A smooth distillation curve is particularly important in oils for use with vaporizing burners, whether they be range, pot type or of the familiar wall-flame design. Here again it is desirable to have a maximum specified for either the 90 per cent fraction or the end point reading. Thus protection is maintained against inclusion of heavy oil portions which are unburnable, or cause carbon collection. Such fractions may enter the oil accidentally, for example, by contamination from storage or handling in dirty heavy oil tanks. A distillation test is the best insurance against troubles of this kind.

Viscosity:

The viscosity of an oil is the measure of its resistance to flow. This factor is of the very greatest importance in the operation of the common pressure atomizing type burners which require oil of uniform viscosity in order to maintain a steady firing rate. Any change in the viscosity of the oil —as may occur from one tank filling to the next—is immediately reflected in a different firing rate for the same nozzle at the same atomizing pressure. As there is no corresponding change in the air flow for combustion, the oil-air ratio is disturbed and the burning efficiency drops.

Furthermore any change in temperature affects the apparent viscosity of an oil. As the surrounding temperature drops the oil does not flow so readily. While this characteristic is not marked in domestic fuel oils it is very much more noticeable in No. 3 oil than it is in the two better grades. Thus if the oil is stored subject to wide variations in temperature, as occurs when above-ground tanks are installed under porches, and to a lesser degree on basement installations, there will be variations in oil flow thru the burner. Beside affecting the burning rate, the spray angle from the atomizing nozzle may be changed. To reduce the possibility of such loss in burning effectiveness, either No. 1 or No. 2 oil should be specified.

Pourpoint:

The pourpoint of an oil is the lowest temperature at which it will flow as it is cooled. This is important where weather conditions are such that trouble may be encountered in handling and delivery. Consequently, lower pourpoint products should be specified for use in cold climates. A recent check

in the New England States showed that almost all domestic fuels were close to or below zero F. in pourpoint reading. As a high pourpoint produces characteristics similar in effect to high viscosity in an oil, low readings for pourpoint are furthermore desirable to minimize variations in firing rate as the temperature fluctuates.

Water and Sediment:

There is no valid excuse for any appreciable amount of water or sediment in any of the three domestic grades. When it is present it is usually the result of accident or carelessness in handling. Grades No. 1 and No. 2 are less likely to show the effects of such contamination as their lower viscosity allows more rapid precipitation.

Carbon Residue:

The amount of carbon residue present in an oil is an indication of the tendency of that oil to form coke or to precipitate carbon during operation. This determination therefore is of great value in establishing the degree of satisfaction with which the oil may burn in range and vaporizing type units. It should be made clear that an oil which is transparent in appearance is not necessarily low in carbon residue, as the high temperature of the test itself may result in a cracking of the oil with carbon precipitation just as will occur in normal burner operation. Recognition of the value of this test is rapidly increasing and more care is now given in refining practice to maintaining carbon residue at a minimum.

Ash:

Ash content is not allowed in oils for domestic use. Thus non-combustibles such as sand, dirt, tank scale, and the like which are destructive to mechanical operation of the unit and which may clog strainers and nozzles, are minimized. Dependence is placed upon careful straining at the burner to remove foreign matter which may enter after delivery to the customer's tank.

In the early days domestic fuel oil was only of incidental interest to the refiner and, even though present-day specifications had been available, probably few if any refiners would have considered their adherence warranted. From an estimated 21,000 burners in operation at the end of 1921 the total in use has increased steadily until the number operating last heating season was approximately 1,350,000. At least 200,000 more will be added to the total this year which at an average consumption of oil conservatively placed at 1500 gallons, will call for delivery of 300 million gallons to supply the increase alone.

It is little wonder that the oil industry is now willing to concede that the domestic fuel oil market is of major importance, and that its cultivation warrants serious attention and is entitled to a large investment in effort and capital. This is now being given and as a consequence much valuable information is accruing from fuel oil research in the laboratories of the important oil companies.

At the present moment, one of the leading refiners, besides meeting the commercial specification, has an additional list of more than six tests and analyses which its oil must meet before marketing. Each one of these checks has been proved of value from actual field experience. In some cases no known tests were available when the need arose, but have since been evolved and their merit established and standardized for this company's products. Needless to say, such accurate control goes much farther than the standards to assure reliable operation.

In all probability, time will establish the merit of many of these extra precautions. When each test is generally recognized as desirable, it will be included as standard procedure. The present commercial standard specifications form an excellent control for fuel oil quality, but it is apparent that best results are only possible if those standards are revised and charged as experience dictates.

Handling and Distributing Fuel Oil:

Success of the fuel oil marketer depends upon his ability to increase the number of new customers and at the same time retain those already using his products. As in the sale of any other commodity, customer satisfaction is essential and the delivery of a sub-standard product, even temporarily, not only causes a direct loss to the fuel oil man before the defect is remedied, but is certain to seriously affect the confidence of customers. Any such loss of confidence immediately makes the customer vulnerable to the sales appeal of a competitor. Many fuel oil men will testify to the serious losses resulting from a fluctuation in quality, or an accident in the dealer's handling or delivery method.

Checking Specifications

To protect against a sub-standard product, the dealer has a very definite procedure available, which will give reasonable assurance of his products. In the first place his orders should specify that the oil meet the requirements of the commercial standard specifications in all respects. With this incorporated as a routine matter in all purchase orders, the refiner knows what is wanted, and the dealer makes his acceptance dependent upon delivery of oil of the required quality.

MANY dealers, even some with considerable gallonage, do not make a serious attempt to satisfy themselves that the oil delivered meets specifications. With the investment of thousands of dollars in storage facilities and delivery equipment, and with the good will of his customers dependent upon undeviating quality, it would seem self-evident that the marketer must assure himself of every load of his product. Yet many place the very success of their business in the hands of their suppliers without question. When the supplier happens to be a responsible refiner giving careful attention to his fuel oil business, the danger may not be great, but even then accidents may occur. However, when the dealer purchases from more than one source, or changes his source from time to time, it is vitally important that he check his incoming products.

The cost of test equipment need not be large, and is small indeed in comparison with the insurance it provides. As a beginning, probably the first and most important test is that of fractional distillation, and no dealer should be without this apparatus. Additional equipment can be added until all standard tests are made, and he should not be satisfied until every check is made as a matter of routine. This is best done by assigning one individual to the work and making a definite rule that no oil be accepted into his tanks unless it fulfills specifications.

Even though the individual assigned to this work has had no previous experience in the testing of oil, this is only a temporary handicap. Explicit instructions for each procedure is given by the American Society for Testing Materials in its "Standards on Petroleum Products and Lubricants." Furthermore, every refiner has full facilities and trained personnel, and will be glad to assist in the training of his customer's technician upon request. A day or two for introduction to the established procedure at the re-

Laboratory Equipment for the Fuel Oil Marketer

From the standpoint of the oil marketer selling heating oils, it is most important that he be assured a supply of oil of suitable characteristics and not fluctuating in quality, it is pointed out in the accompanying article.

His orders to his source of supply should specify that the oil meet the requirements of the accepted commercial standards in all respects, the author states, which is an advantage to the refiner in that he knows exactly what is wanted.

He goes on to suggest that oil marketers buying from more than one source of supply particularly, provide themselves with the necessary laboratory testing equipment to test their receipts of oils to make sure they meet the accepted standards. Such procedure on the oil marketer's part could be made a good sales point also. The first and most important test which should be made, it is brought out, is that of fractional distillation of the oil.

finer's laboratory and thereafter contact at frequent intervals is bound to have a stimulating effect upon both groups to their mutual benefit.

With oil of proper quality in the dealer's tank, several possibilities remain for it to change characteristics or become contaminated before it is burned in the customer's installation.

Moisture may condense in the bulk storage tank itself, particularly when the tank is only partly filled, and such accumulations filter through the oil and collect at the bottom. Adequate bottom drainage will usually remove such moisture without damage to the oil except in some cases where the oil itself tends to emulsify with the water. In general it is well to minimize the possibility of any more mixing with moisture than is absolutely necessary.

Certain fuel oils in storage, particularly during the summer months, may have a tendency to form gum and it is well to have the oil checked before deliveries are started in the fall.

Dirt may accumulate in the oil and be carried with it in suspension—the lower the viscosity of the oil, the less likely it is to cause trouble on this score. Thus a perfectly clean oil may collect dirt, rust, and scale from the inside of the bulk storage tank, from the truck tank, and the installation itself. In fact, oil may be clean up to the time it enters the burner line and yet pick up enough foreign matter to cause erratic atomization in the pressure type burner.

The diameter of the orifice in an atomizing nozzle designed to burn one gallon of oil per hour is less than 12 thousandths of an inch. To function for a heating season without attention, which is a reasonable expectation, necessitates that not a single particle of foreign matter large enough to be readily seen by the human eye may reach the nozzle. It is rapidly becoming recognized that this condition presents an inherent and fundamental shortcoming in pressure burners designed for low firing rates of one gallon per hour and less. Having in mind the tremendous potential market for burners in small homes, and in medium size houses with insulation, where a one-gallon firing rate is adequate, it is the speaker's considered opinion that the successful burner for the small home will not be of the conventional high pressure atomizing type, but rather in some other form without extreme orifice limitation.

Progress In Specifications

Generally speaking we may view with some degree of satisfaction the progress made in domestic oil specifications. As recently as five years ago, one large refiner was supplying from a single plant, 21 distinct and separate grades of fuel oil, not one of which was made to close specifications. Today finds but three numbered grades—reasonably specified—for automatic domestic service. Yet we are more than willing to concede that we are but part way along the road to maximum satisfaction for all concerned. Let us look for a moment to the automobile for an indication of what may be expected in the burner industry.

Not many years ago gasoline was sold by gravity specifications, with a wide selection ranging from casinghead gasoline, most of which disappeared by evaporation through the vent, down practically speaking to kerosine, most of which remained in the engine.

Within the past few years the industry has simplified its handling problem, despite the increased use of high compression engines, by concentration on the distribution and sale of but two grades of gasoline. Both of these are quite satisfactory and there is little or no apparent demand for greater variety.

With the case history of gasoline as a guide, the need for further progress in oil fuel is clearly indicated. The elimination of a single unnecessary grade of fuel will materially decrease the cost of manufacture, handling, and distribution. Less tankage will be required at each point of storage, and better use can be made of the storage available. Trucking problems are simplified and there is less chance for contamination by mixing, or accidental delivery of an improper fuel.

In addition to assisting the owner, any reduction in number of grades simplifies our story to the burner prospect. This angle is worthy of more attention, especially in view of the present active competition of other fuels. To illustrate; the stoker salesman emphasizes the ready availability of stoker coal at so much cost per ton. He does not confuse his prospect by telling him that stoker coal comes in grades No. 1, No. 2, No. 3, and sometimes No. 4, and that he can only burn certain of them. In the case of gas, but a single fuel is available for which is claimed the double barrelled advantage of automatic delivery, and payment after use. Both arguments unquestionably have their influence upon the prospect in favor of gas fuel.

In contrast, the oil burner salesman deluges the prospect with claims, counterclaims and endless debate on the mechanical merits of various burners, what oils they will handle, relative heat values, what they cost, and so on. And all the while the prospect becomes more confused, his confidence in oil as a fuel is shaken, and likely as not he finally decides against it. The sooner oil and burner salesmen realize the harm they are causing by childish bickering on the pros and cons of various oils, nonsensical trade names concocted for conventional burner parts, and the elaborate theories of burner combustion; the sooner our prospects will be willing to accept oil as a fuel rather than be driven by the force of our confused logic to gas or coal.

Reduction In Grades Urged

Any reduction in the number of oils available for home heating will be a worthwhile move in the right direction. For a time the issue was further beclouded by the sale of so-called No. 4 oil; by classification an industrial fuel for domestic use. In most cases this was actually a No. 3 oil being

1938 New Car Lubrication Issue

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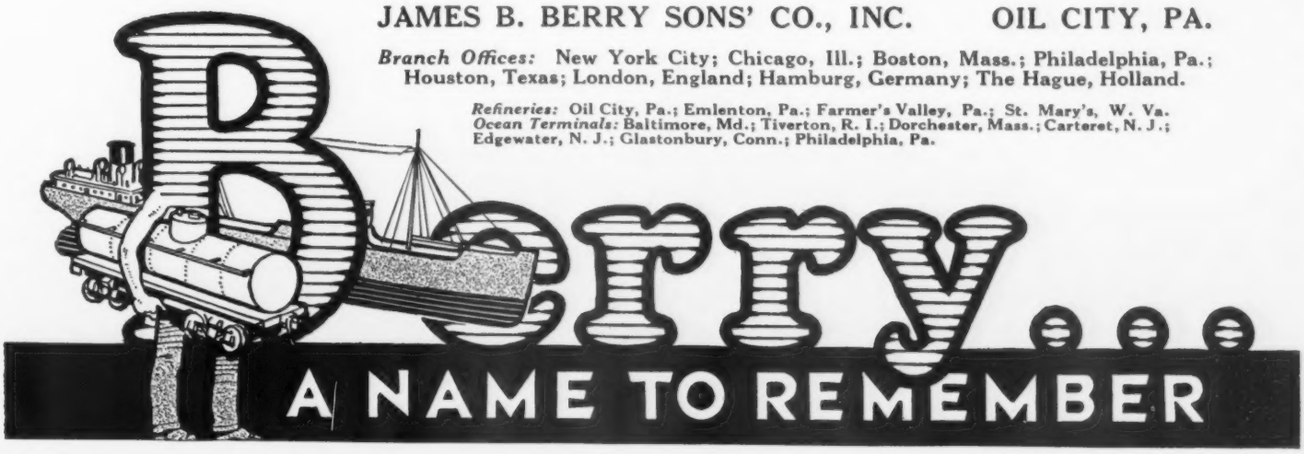

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marketed under the name and price of the heavier grade. Fortunately this situation has now largely taken care of itself, as all concerned have learned that a true No. 4 oil is not suitable for home service.

At the present time numbers 2 and 3 oils are available generally at the same price per gallon, and in the New England states in particular, when No. 3 oil is ordered it is usually delivered from No. 2 oil storage. In some sections No. 3 oil as a grade is extinct and oil actually refined to those specifications is not obtainable.

This distinct movement to a lighter oil for use in automatic controlled mechanical burners of every type is founded upon a number of important basic considerations. At the risk of possible criticism from the oil industry for which the writer does not claim to speak with authority, it will cost no more per gallon to make but a single grade of oil No. 2 requirements than it does to make both specifications. The total cost will most certainly be reduced if the savings thru storage and distribution of a single grade are taken into account.

Furthermore, numerous oil men have reached another conclusion long held by many of the burner fraternity, namely that not only increased reliability, but marked fuel savings result from the use of a lighter oil.

The recent findings of one of the largest middle west distributors of domestic fuel showed a seasonal savings of as high as 15 per cent in fuel cost with mechanical atomizing burner installations when a lighter oil than No. 3 was used. This saving resulted from several factors. A closer air setting was practical without smoke—thus reducing the excess air flowing thru the burner and boiler at all times. Variations in oil flow noted on the heavier oil were greatly reduced and the possibility of impaired atomization due to foreign matter in the nozzle or strainer largely eliminated. Probably most important of all from an economy angle was reduction in boiler loss due to the gradual collection of soot on the heat-absorbing surfaces. With light oil the boilers were practically as clean at the end of the season as at the beginning, while previously the same installations using heavier oil had shown a definite heat-retarding accumulation.

Furthermore, the prevalence of clogged strainers and nozzles is greatly reduced when light oil is used. We all know from experience that it is unusual to find a customer who makes any pretense of cleaning the strainer on his burner. However, no matter how long a period has elapsed since cleaning, a clogged strainer, as far as the customer is concerned, is a burner failure and so credited in his mind. Thereafter his confidence in unfailing operation is impaired. As light oil is notably free from materials which may affect the filters and also quite unlikely to carry scale, rust, and dirt in suspension, filter attention is seldom needed.

The desirability of reducing the number of grades of home heating oils is clearly indicated. This movement, already well under way, merits the support and active assistance of every group interested in the long range welfare of the burner and fuel oil industries.

Use of No. 1 Oil

Let us turn our attention briefly to the characteristics and use of No. 1 oil. Originally oil to that specification was rather widely used for certain makes of vaporizing type burners. As time went on its use for rotary burners fell off due to advances in design enabling them to use a heavier grade. At the same time the vaporizing type space heater came into popularity. While it was found that a No. 1 oil could be used, relatively frequent cleaning and attention was needed to keep it functioning properly. When kerosine was burned most of this attention was eliminated. Concurrently the range burner of the ring type attained quick popularity and widespread use, notably in the New England States. Here again kerosine was essential to satisfaction.

Recognizing the necessity of supplying a No. 1 fuel which would be reliable for both the ring type and space heater units, most of the oil companies followed the only practical course under the circumstances. They supplied either kerosine or its equivalent as No. 1 oil, to the immediate satisfaction of all concerned. This practice continues, and probably the No. 1 specifications will be changed to bring them into conformance as time goes on.

With universal acceptance of oil heat and reliable equipment of reasonable cost available for the widespread small home market—the oil heating industry faces an unparallelled opportunity. The rapidity with which that opportunity bears fruit depends largely upon the united efforts of burner manufacturer, refiner, and marketer. They must make it economically feasible for the small home owner to purchase and operate an oil heater. The designer and manufacturer, with greatly enlarged research facilities may be depended upon to supply reliable mechanical equipment. On the refiner and marketer lies the responsibility of producing and delivering fuel which will give unfailing satisfaction at reasonable cost.

Canada Production Making New High

CLEVELAND, Nov. 29.—Production of petroleum in Canada for the first eight months of 1937 surpassed in volume total for any full year since the beginning of the industry there. Production reached 1,592,352 barrels at the end of eight months, which compares with the previous highest annual production of 1,542,471 barrels in 1931. Production of 288,934 barrels in August is double the average production of any month in 1935 and 1936.

TRADEMARKS

The following are trade mark applications pertinent to our field pending in the United States Patent Office which have been passed for publication and are in line for early registration unless opposition is filed promptly. For further information address National Trade-Mark Company, Munsey Building, Washington, D. C., trademark specialists.

As an additional service feature to its readers, this journal gladly offers to them an advance search free of charge on any mark they may contemplate adopting or registering. You may communicate with the Editor of this Department, or send your inquiry direct to the National Trade-Mark Company, stating that you are a reader of this journal.

Pub. Oct. 26, 1937

PHANTOM FILM, Ser. No. 384,804. The Lubri-Zol Corporation, Cleveland, and Wickliffe, Ohio. Filed Oct. 26, 1936.
For Lubricating Oils and Greases. Lubricating Oil Compounds, and Motor-Lubricating Oils.

FAMILEX, Ser. No. 393,199. Romeo Parent, doing business as Familex Products Company, Montreal, Quebec, Canada, filed May 24, 1937.
For Machine Oils.

BRAD-FIELD, picture of oil wells, Ser. No. 396,583. Henry Howard Sessions, Los Angeles, Calif. Filed Aug. 19, 1937.
For Lubricating Oils and Greases and Extreme Pressure Oils.

CHEVRON, Ser. No. 396,698. Standard Oil Company of California, San Francisco, Calif. Filed Aug. 23, 1937.
For Lubricating Oils, Flushing Oils.

* * *

Pub. Nov. 2, 1937

ESSO, Ser. No. 397,058. Standard Oil Company of New Jersey, Wilmington, Del. Filed Sept. 2, 1937.
For Leather Oil.

ALIGO, Ser. No. 395,872. Manhattan Lubricants Co., Inc., Brooklyn, N. Y. Filed July 31, 1937.
For Non-Slip Composition for Pulleys.

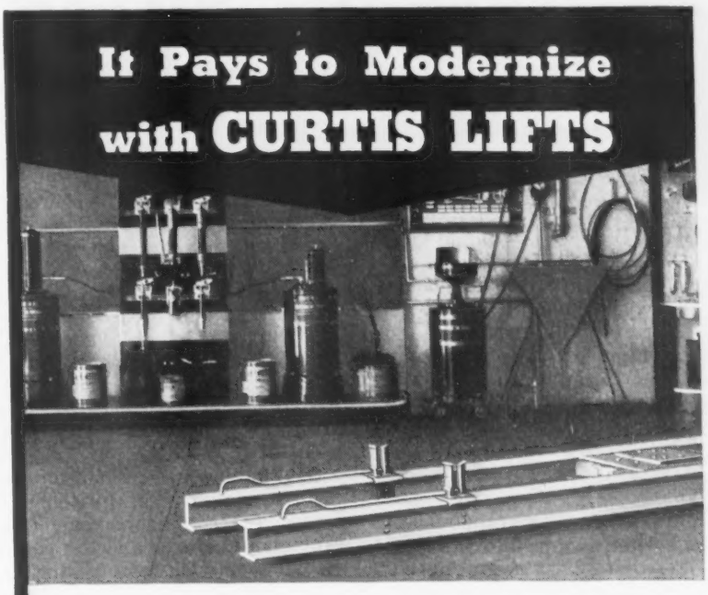
PARASHADE, Ser. No. 395,843. Standard Oil Development Company, Linden, N. J. Filed July 30, 1937.
For Dye for Oils.

POLYGAS, picture of a monument in a circle, Ser. No. 381,854. Southport Petroleum Company, Kilgore, Tex. Filed Aug. 5, 1936.
For Gasoline.

PENN AMOCO, Ser. No. 395,466. The American Oil Company, Baltimore, Md. Filed July 21, 1937.
For Lubricating Oils and Greases.

Q T, Ser. No. 396,593. Cities Service Oil Company, Bartlesville, Okla. Filed Aug. 20, 1937.
For Quenching Oil.

P V, Ser. No. 396,594. Cities Service Oil Company, Bartlesville, Okla. Filed Aug. 20, 1937.
For Journal and Heavy Duty Oil.



Bader Motor Co., Inc., Astoria, Ill.

Curtis Lift installations like the above do their own selling. Many garages and service stations can testify to definite increases in volume and profit after installing Curtis Lifts. The improved facilities make possible better lubrication in less time at a greater profit. • Special CURTIS features include:

- **COMPLETE ACCESSIBILITY**—every lubrication point easily reached.
- **HANDLES ALL CARS**—any make, any model.
- **SELF-LEVELING PLATFORM**—won't stick coming down.
- **DROP-AWAY WHEEL GUIDES**—automatically center car.
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Automotive NOTES AND COMMENTS

By **JOHN W. THOMPSON**
N. P. N. Staff Writer

DETROIT

NOW everyone should feel better. The pre-season mystery has been stripped from the 1938 models, so now everyone can get back to repairing their bathtub fixtures and painting their barns. Already there are reports of a slight slackening in new car production and the sit-downers have again started to sit down in various corners of General Motors plants, so it looks as though things are about normal.

Practically all car manufacturers have by this time swung into full production. Ford, however, is getting off to a slow start and is very independent about the whole thing.

In spite of the bugle-blowing publicity about 1938 being another bonanza, some of those who sit in the plush-bottom seats in the automotive industry and do their thinking only behind locked doors seem to feel that it will be a good year if the 4,000,000 mark is reached. This is about a million less than the 1937 quota.

* * *

The motoring public liked the 1938 automobile shows. Take it from Willoughby Bilgewater, on whose man-on-the-street opinion we often rely. Willoughby was cornered as he came out of the New York Auto Show. Asked his opinion of the new models, Willoughby replied, "I can add little to what has already been said by others who have seen the show, except to possibly augment their statements with this one thought. I think the new cars are the nuts."

* * *

To those of us who have lost the key to prosperity and are now trying to pick the lock, the practice of the various auto shows in charging admission is a little out of time. Of course, this is America, and therefore probably there is reason to making a prospect pay to see a product before he buys it.

The recent national truck show in Newark, N. J., had a free gate, and you may be sure it attracted many an infinitesimal truck prospect who would have stayed home if a price had been placed on his invitation. In fact it was such a novelty that your correspondent found himself just walking back and forth through the gate for the sheer pleasure it afforded.

* * *

Windemere Bendback, who takes care of all our bright sayings and slander suits, firmly believes that success is always the result of honest effort. As he puts it—"There is no secret to success. You will notice that the longer you stay on the street car the better seat you'll get."

Windemere's logic, of course, doesn't take into effect such practice may take you past the stop where you should get off. Bill James, Studebaker's chief engineer, indicated this when he recently told the grease manufacturers that, in effect, both the car manufacturers and grease manufacturers have been so busy riding their own street cars that they have gone past the stops where they should have gotten off to do a little co-operating.

Said James, in commenting upon efforts to simplify the number of lubricants, "the contact between the lubricant manufacturer and the car designer has been so remote that no one really knows what could really be done if a real effort was made to reduce the number of lubricants required to service a motor car."

The lady in the what-the-hell hat is about to hoist herself through the family entrance of this road-hugging Cadillac convertible cabriolet. The "operator" in the front seat has several accomplishments to his credit, one being his fortitude in handling this beast of the open road
(Photo courtesy of Socony-Vacuum Oil Co.)

Our things-to-think-about-but-don't-ever-mention-them department includes this problem of lubricant simplification on its list of "musts", and now James, to whom tradition and custom are but a challenge to something better, points out some possibilities which might approach a Utopian all-purpose lubricant.

As an example, he mentions the increased use of the same grade of lubricant for all seasons in some hypoids, and that how, with modification, this might be extended to include the steering gear. Transmissions, according to James, might be designed to use a heavier grade of engine oil for all-year service, and wheel bearing grease might be made a water-proof grease. He believes it is entirely possible that graphite greases for springs could be eliminated and wheel bearing grease used, and that with small parts design changes and lubrication alterations, hypoid lubricants could be used for general chassis lubrication as well as for rear axle and steering gear.

Then there is the question of extreme pressure engine oils, but that, like the recipe for pineapple upside-down cake, is another matter.

* * *

During 1937, over $5,000,000 will be spent in the General Motors plants in the U. S. and Canada for the protection of the health of its 210,000 workers. This money is being used for medical equipment, hospital facilities, salaries, supplies, physical examinations and surveys to safeguard employes from occupational diseases. A considerable portion of this amount is being spent for the control of dust and fumes in shops and foundries.

* * *

If you'll promise not to write in asking a lot of questions about it that we can't answer, we'll tell you about America's "ghost road", which disappears in winter, only to return again when the bloom comes to the rose and the flies begin to annoy the custard pie. This here-in-summer and gone-in-winter highway is 61 miles in length and is created by the expansion of concrete during the summer heat. This 61-mile stretch represents the maximum expansion of the more than 100,000 miles of concrete highway in the U. S.

We don't ask you to take our word for it; in fact, we hope you won't. We refer you to G. J. Irwin, highway engineer for the B. F. Goodrich Co., who evidently makes it his business to find out where a highway goes in winter.

* * *

Last year over 5000 extra copies of the Annual New Car Lubrication Issue of NATIONAL PETROLEUM NEWS were distributed by large and small oil companies to their dealers and field representatives. Although the 1938 edition has not yet been officially announced, close to 1500 extra copies have already been sold. It is regrettable that some waited too late last year to place their orders, and were disappointed. Yes, this is a hint.

* * *

Surely at some time or other you have wanted to follow an automobile through its embryo stages of early design, development, and finally its birth.

Graham has felt this burning desire which is smouldering within your breasts, and has given forth an interesting description of the car from conception to delivery, and which we have reduced to a skip-the-rope sequence.....

(*Continued on page* 52)

Markets

At A Glance . . .

Pennsylvania: 200 vis. neutral oils priced lower.

Mid-Continent: East Texas refiners get 200-car inquiry.

Eastern Seaboard: Pennsylvania gasoline prices lower.

Mid-Western: Gasoline unsettled in quiet trading.

California: Trading quiet in short holiday week.

Coastal: Small gasoline cargo sold.

Wax: Coastal markets featureless.

Pennsylvania

200 Neutral Oils Down

N. P. N. News Bureau

CLEVELAND, Nov. 29.—Neutral oils, 200 viscosity at 70 grades, sold at lower prices last week. 25 pour test, 200 neutral oil sold at 18.5 cents per gallon, f.o.b. the field. This was a drop of 2 cents below the previous week. Manufacturers of the lower pour test oils said they were in a position to hold stocks off the market, if necessary, and prices on these grades were reported only at 1 cent lower than the previous week.

Cylinder stocks moved almost entirely on an inter-refinery basis, according to reports from the field; quotations to jobbers were unchanged, however. Bright stocks were firm.

U. S. Motor gasoline evidently was at a parity with Michigan competition at 5 cents per gallon f.o.b. lower field refineries. U. S. Motor grade was not plentiful in the upper field and sold in the immediate area at 6 cents.

Kerosine and fuel oil continued active and supplies were reported short of demand. White crude scale wax continued to find a ready market.

Mid-Continent

Prices Generally Unchanged

N. P. N. News Bureau

TULSA, Nov. 29. — Mid-Continent gasoline prices generally remained unchanged last week despite the fact that jobbers continued buying on a hand-to-mouth basis. Supplies continued to exceed demand, although refiners reported they were endeavoring to bring gasoline output down more nearly in line with demand. Stocks at some plants, however, continued to increase, according to reports.

East Texas refiners received an inquiry for 200 cars of 400 end point gasoline for shipment to the Gulf last week. Some options were taken, but no actual business had been placed as the week ended. East Texas refiners were moving about 10,000 barrels of gasoline daily in trucks. Truck prices were higher than tank car prices and netback at refineries was greater.

Natural gasoline manufacturers reported they had little Grade 26-70 to sell. Active demand the previous week apparently took most of their output. Prices were steady at 3.75 cents both f.o.b. Breckenridge and Group 3.

A ready market for kerosine and range oil was reported by most refiners. Prices were steady.

Lubricating oil prices were unchanged. Competition from Pennsylvania was reported not as keen, despite reduced prices. Most Mid-Continent suppliers reported they were in fairly good position. Export inquiry for neutral oil was brisker, reports indicated.

Wax was in good shape.

N.P.N. Gasoline Index

	Dealer T.W. Cents per	Tank Car Gallon
Nov. 29	10.30	6.21
Month ago	10.51	6.47
Year ago	10.05	6.30

Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

Tank car index is a weighted average of 13 wholesale markets for regular-grade gasoline.

Eastern

Pennsylvania Gasoline Down

N. P. N. News Bureau

NEW YORK, Nov. 29.—Reductions ranging from 0.25 to 0.75 cent a gallon in consumer tank car and dealer tank wagon prices of gasoline throughout Pennsylvania were the outstanding changes noted along the eastern seaboard the past week. The changes were first announced by Standard of Pennsylvania and were met by other companies, including Atlantic Refining Co. The previous week general reductions of 0.75 cent were made throughout the Standard of New Jersey territory.

Open spot tank car markets for unleaded gasolines were lowered 0.25 cent by a number of companies at New York harbor and Philadelphia, bringing their quotations to 7.25 cents for 65 octane and above grade at both points. However, other companies already had been offering this grade at that figure. Some reports that 65 octane and above gasoline was being offered in tank car lots at 7 cents f.o.b. New York harbor and in the Boston district were heard but confirmation was lacking. The majority of traders were asking 7.25 cents for open market tank car movement as the week ended, according to their reports.

Open market demand for gasoline was fairly good for the season, suppliers stated, while shipments against contracts were satisfactory. So far, the weather has been favorable for motoring in most eastern seaboard districts.

Mid-Western

Gasoline Unsettled

N. P. N. News Bureau

CHICAGO, Nov. 29. — A variable trend was apparent in the Mid-Western gasoline market the week ended Nov. 27. Early in the week prices improved somewhat when some refiners withdrew offerings. Jobber demand continued slow and prices eased as the week progressed.

One source of supply for Chicago resellers said that he was withdrawing all quotations until prices for finished products became more in line with prices for crude oil. Other refiners who withdrew offerings did not indicate the reason for withdrawal.

As the week ended, however, the majority were again seeking to move gasoline through Chicago resellers.

Gasoline continued to improve in the Central Michigan market and some refiners advanced prices last week. Probably the greatest factor in the betterment of gasoline in Michigan was the forced curtailment of crude runs. Quite a few plants in this district were said to be curtailing runs because of limited storage for heavy fuel oil which was not finding a ready market.

Kerosine was steady, although move-

REFINERY TANK CAR MARKETS

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days). Prices in cents per gallon, except heavy fuel oils in dollars per barrel, tank car lots, f.o.b. refineries in districts designated, except where otherwise noted. Inter-refinery and export prices not included, unless so stated in the respective markets. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude. Unless otherwise noted, gasoline octane ratings are determined by C.F.R. Motor method, A.S.T.M. D-357-33T; and lubricating oil specifications determined according to A.S.T.M. methods, unless otherwise noted.

Gasoline *and* Naphtha

Prices Effective	Nov. 29	Nov. 22
OKLAHOMA		
U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	4.125– 4.375	4.125– 4.375
63-66 oct.	4.50 – 4.75	4.50 – 4.75
67-69 oct.	4.875– 5.125	4.875– 5.125
70-72 oct.	5.25 – 5.50	5.25 – 5.50
60-62, 400 e.p.	*4.25 – 4.50	*4.25 – 4.50
64-66, 375 e.p.	*4.75 – 5.125	*4.75 – 5.125
68-70, 350-360 e.p.	*5.00 – 5.375	*5.00 – 5.375
WESTERN PENNA.		
Bradford-Warren:		
Motor gasoline:		
U.S. Motor (58-62°)	6.00 – 6.125	6.00 – 6.125
Min. 65 oct.	7.25 – 7.50	7.25 – 7.50
64-66, 390 e.p.	6.125– 6.25	6.125– 6.25
Other districts:		
54-56 naphtha	5.00 – 5.25	5 00 – 5.25
Motor gasoline:		
U.S. Motor (58-62°)	5.00 – 5.25	5.00 – 5.25
Min. 65 oct.	7.25 – 7.875	7.25 – 7.875
64-66, 390 e.p.	*5.50	*5.75 – 5.875

CENTRAL MICHIGAN (Prices f.o.b. Cent. Mich. refinery group basis, for shipment within Michigan. Shipments, however, may originate at plants outside Central group).

Str.-Run Gasoline	*5.25 – 5.50	†*5.25 – 5.50
64-66 octane gas	8.125– 8.50	7.75 – 8.00
68-70 octane gas	7.75 – 8.00	8.125– 8.50

*Excluding Detroit shipment.

†Correction: This price correct for Nov. 22.

CALIFORNIA (3c tax to be added to prices if used in state)

U. S. Motor:		
54-58, for instate shipment	8.00 – 9.25	8.00 – 9.25
54-58, for outside state shipment	8.50 – 9.00	8.50 – 9.00
58-61, 375-400 e.p., 65 oct. & above	8.75 – 9.75	8.75 – 9.75

†N. TEX. (For shipment to Texas and N. Mex. destinations; Group 3 prices quoted on northern shipments).

U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	*4.50 – 4.875	*4.50 – 4.875
63-66 oct.	*5.00 – 5.375	*5.00 – 5.375
67-69 oct.	*5.375– 5.75	*5.375– 5.75
70-72 oct.	*5.625– 6.00	*5.625– 6.00
60-62, 400 e.p.	*4.625– 4.875	*4.625– 4.875

KANSAS (For Kansas destinations only)

U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	4.50 – 4.75	4.50 – 4.75
63-66 oct.	5.00 – 5.375	5.00 – 5.375
67-69 oct.	5.375– 5.625	5.375– 5.625
70-72 oct.	5.625– 5.875	5.625– 5.875

†W. TEX.

U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	4.625– 4.75	4.625– 4.75
63-66 oct.	5.125– 5.25	5.125– 5.25
67-69 oct.	5.50 – 5.625	5.50 – 5.625
70-72 oct.	5.875	5.875

†E. TEX.

60-62, 400 e.p.	*4.375– 4.50	*4.375– 4.50

N. LA. (For shipment within La. & into Ark.)

U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	4.75 – 5.00	4.75 – 5.00
63-66 oct.	5.00 – 5.25	5.00 – 5.25
67-69 oct.	5.25 – 5.50	5.25 – 5.50
70-72 oct.	5.75 – 5.875	5.75 – 5.875

ARKANSAS (For shipment within Ark. & into La.)

U. S. Motor: (a) (Octane Test L-3)		
62 octane & below	4.75	4.75
67-69 oct.	5.50	5.50

OHIO (Quotations of S. O. Ohio. Delivered anywhere in Ohio).

U. S. Motor	8.00	8.00
Above 65 oct.	8.25	8.25

Natural Gasoline

(Prices are those to blenders on freight basis shown below. Shipments, however, may originate in other Mid-Continent manufacturing districts, such as Panhandle Texas, S. W. Texas or Kans.)

Prices Effective	Nov. 29	Nov. 22
F.O.B. GROUP 3		
Grade 26-70	3.75	3.75

*Nominal.

‡Only one refiner quoting.

†Refiners report they generally receive from 0.25c to 0.5c per gal. more for gasoline & kerosine for local or differential territory shipment.

(a) In line with National Petroleum News' policy of reflecting general trade practice, the above revisions in octane brackets, determined according to L-3 method, for U. S. Motor gasoline, have been made in the Okla. and Kans. markets, effective Sept. 20, 1937; in North and West Texas, Arkansas, and North Louisiana, Oct. 4; in Mid-Western markets, effective Nov. 29. Formerly, octane numbers were: 62 & below, 63-67, and 68-70.

Prices Effective	Nov. 29	Nov. 22
Natural Gasoline (Cont'd)		
F.O.B. BRECKENRIDGE		
*Grade 26-70	3.75	3.75

CALIFORNIA (F.o.b. plants in Los Angeles basin)

75-85, 350-375 e.p. for blending	7.50 – 7.75	7.25 – 7.75

Kerosine

WESTERN PENNA.		
Bradford-Warren:		
45 w.w.	5.50 – 5.75	5.50 – 5.75
46 w.w.	5.625– 5.875	5.625– 5.875
47 w.w.	5.75 – 6.00	5.75 – 6.00
Other districts:		
45 w.w.	5.375– 5.50	5.375– 5.50
46 w.w.	5.50 – 5.625	5.50 – 5.625
47 w.w.	5.625– 5.75	5.625– 5.75

CENTRAL MICHIGAN (Prices f.o.b. Cent. Mich. refinery group basis, for shipment within Michigan. Shipments, however, may originate at plants outside Central group.)

47-49 w.w.	5.30 – 5.55	5.30 – 5.55
OKLAHOMA		
41-43	4.00 – 4.25	4.00 – 4.25
42-44 w.w.	4.125– 4.375	4.125– 4.375

KANSAS (For Kansas destinations only).

41-43 w.w.	4.375– 4.50	4.375– 4.50
42-44 w.w.	4.50 – 4.625	4.50 – 4.625

†N. TEX. (For shipment to Texas and New Mexico destinations; Group 3 prices quoted on northern shipments).

41-43 w.w.	4.25 – 4.375	4.25 – 4.375
†E. TEX.		
41-43 w.w.	*4.00	*4.00

N. LA. (For shipment within La. and into Ark.).

41-43 w.w.	4.50	4.50

ARK. (For shipment within Ark. and into La.).

41-43 w.w.	‡4.50	‡4.50
CALIFORNIA		
40-43 w.w.	6.00 – 7.00	6.25 – 7.00

Gas *and* Fuel Oils

WESTERN PENNA.		
Bradford-Warren:		
36-40	5.125– 5.25	5.125– 5.25
Other districts: (Excluding Pittsburgh District Prices).		
36-40	4.75 – 4.875	4.75 – 4.875

CENTRAL MICHIGAN (Prices f.o.b. Cent. Mich. refinery group basis, for shipment within Michigan. Shipments, however, may originate at plants outside Central group.

P.W. Distillate	5.00 – 5.25	5.00 – 5.25
No. 3 gas oil, str.	4.625– 4.75	4.625– 4.75
U.G.I. gas oil	4.50 – 4.75	4.50 – 4.75
Fuel Oils (Vis. at 100):		
500-700 Vis.	2.50 – 3.00	2.75 – 3.25
300-500 Vis.	2.75 – 3.25	2.875– 3.375
100-300 Vis.	3.00 – 3.50	3.25 – 3.75
OKLAHOMA		
No. 1 white	4.00 – 4.125	4.00 – 4.125
No. 1 straw	3.875– 4.00	3.75 – 4.00
No. 2 straw	3.75 – 3.875	3.75 – 3.875
No. 2 dark	3.625– 3.75	3.50 – 3.75
U. G. I. gas oil	*3.375	*3.375
28-30 zero	*3.50 – 3.75	*3.50 – 3.625
28-30	‡$1.35	‡$1.35
24-26	‡$0.875–$0.925	‡$0.875–$0.925
18-22	*$0.825–$0.875	*$0.825–$0.875
14-16	*$0.80 –$0.85	*$0.80 –$0.85

KANSAS (For Kans. destinations only).

No. 1 p.w. fuel oil	4.125– 4.25	4.125– 4.25
10-14 fuel oil	$0.725–$0.775	$0.725–$0.775

N. TEX. (For shipment to Texas and N. Mex.; Group 3 prices quoted on northern shipments).

No. 1 white	*4.125	*4.125
U. G. I. gas oil	2.875– 3.00	2.875– 3.00
24-26	$0.85 –$0.875	$0.85 –$0.875
18-22	$0.80 –$0.825	$0.80 –$0.825

N. LA. (For shipment within La. and into Ark.).

No. 2	3.50 – 3.625	3.50 – 3.625
20-24	$1.10 –$1.15	$1.10 –$1.15
16-20	$0.95 –$1.00	$0.95 –$1.00
10-14	$0.80 –$0.85	$0.80 –$0.85

ARK. (For shipment within Ark. and into La.).

No. 2	‡3.75	‡3.75
28-30 gas oil, zero	‡3.50	‡3.50

CALIFORNIA

San Joaquin Valley:		
Heavy fuel	$0.60 –$1.00	$0.60 –$1.00
Light fuel	$0.85 –$1.10	$0.85 –$1.10
Diesel fuel (per gal.)	3.75 – 5.00	3.75 – 5.00
Stove dist. (per gal.)	4.25 – 7.00	4.25 – 7.00
Los Angeles:		
Heavy fuel	$0.65 –$1.10	$0.65 –$1.10
Light fuel	$0.90 –$1.20	$0.90 –$1.20
Diesel fuel (per gal.)	3.50 – 5.00	3.50 – 5.00
Stove dist. (per gal.)	4.00 – 7.00	4.00 – 7.00

Prices Effective	Nov. 29	Nov. 22
Gas and Fuel Oils (Cont'd		
San Francisco:		
Heavy fuel	$1.15	$1.15
Light fuel	$1.25	$1.25
Diesel fuel (per gal.)	5.50	5.50
Stove dist. (per gal.)	7.50	7.50

Note: All above heavy fuels meet Pacific specification 400: light fuel, spec 300; Diesel fuels, spec. 200; and stove distillate, spec. 100

Neutral Oils

WESTERN PENNA.

Viscous Neutrals (Viscosity at 70° F.)

200 Vis. (180 at 100°) No. 3 col., 420-425 fl.:		
0 p.t.	22.00 –23.50	23.00 –23.50
10 p.t.	21.00 –22.50	22.00 –22.50
15 p.t.	20.50 –22.00	21.50 –22.00
25 p.t.	18.50 –20.50	18.50 –20.50
180 Vis. (165 at 100) No. 3 col., 410-415 fl.:		
25 p.t.	19.00 –19.50	19.00 –19.50
150 Vis. (143 at 100) No. 3 col., 400-405 fl.:		
0 p.t.	19.00 –19.50	19.00 –19.50
10 p.t.	18.00 –18.50	18.00 –18.50
15 p.t.	17.50 –18.00	17.50 –18.00
25 p.t.	16.50 –17.00	16.50 –17.00

SOUTH TEXAS

Vis. Color		
Pale Oils: (*Vis. at 100° F.; p.t. 0*)		
100 No. 1½-2½	5.25 – 5.50	5.25 – 5.50
200 No. 2-3	7.25 – 7.50	7.25 – 7.50
300 No. 2-3	7.75 – 8.00	7.75 – 8.00
500 No. 2½-3½	8.75 – 9.00	8.75 – 9.00
750 No. 3-4	9.25 – 9.50	9.25 – 9.50
1200 No. 3-4	9.75 –10.00	9.75 –10.00
2000 No. 4	10.00 –10.25	10.00 –10.25
Red Oils:		
200 No. 5-6	7.25 – 7.50	7.25 – 7.50
300 No. 5-6	7.75 – 8.00	7.75 – 8.00
500 No. 5-6	8.75 – 9.00	8.75 – 9.00
750 No. 5-6	9.25 – 9.50	9.25 – 9.50
1200 No. 5-6	9.75 –10.00	9.75 –10.00
2000 No. 5-6	10.00 –10.25	10.00 –10.25

Note: South Texas red oil prices shown above cover oils with green cast; blue cast red oils are slightly lower in some cases.

MID-CONTINENT (Vis. at 100° F.; F.o.b. Tulsa basis).

(0 to 10 P.P.)

Pale Oils: Vis. Color		
60-85—No. 2	5.50	5.50
86-110—No. 2	6.00	6.00
150—No. 3	9.00	9 00
180—No. 3	10.00	10.00
200—No. 3	10.50	10.50
250—No. 3	11.50	11.50
280—No. 3	12.50	12.50
300—No. 3	13.00	13.00
Red Oils:		
180—No. 5	9.00	9.00
200—No. 5	9.50	9.50
250—No. 5	10.50	10.50
280—No. 5	11.50	11.50
300—No. 5	11.75	11.75

Note: Viscous oils, 15-25 p.p., generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p., generally are quoted 0.25c under 0-10 p.p. oils. Viscous oils (150-300 vis.), No. 4 color, generally are quoted 0.5c above No. 5 color oils.

CHICAGO (Vis. at 100° F.)

Pale Oils **0 to 10 p.p.

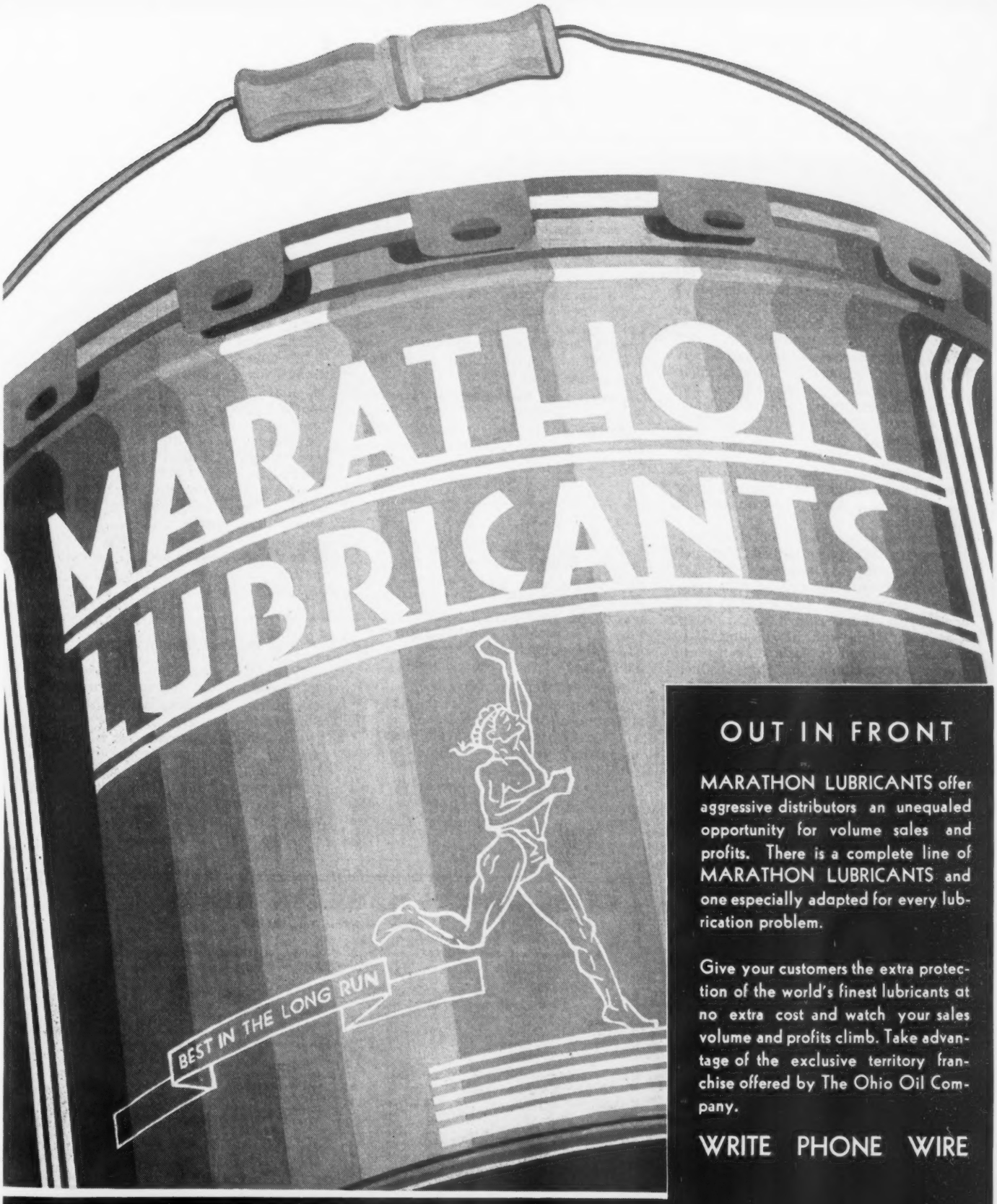
Vis. Color		
60-85—No. 2	7.25	7.25
86-110—No. 2	7.75	7.75
150—No. 3	10.00	10.00
180—No. 3	11.00	11.00
200—No. 3	11.50	11.50
250—No. 3	12.50	12.50
Red Oils:		
180—No. 5	10.00	10.00
200—No. 5	10.50	10.50
250—No. 5	11.50	11.50
280—No. 5	12.50	12.50
300—No. 5	12.75	12.75

**Viscous oils, 15 to 30 p.p. are quoted 0.5c lower, 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., are quoted 0.25c lower. To obtain delivered prices in Chicago, add 0.25c per gal.

Cylinder Stocks

MID-CONTINENT (F.o.b. Tulsa basis)

Bright Stocks:		
190-200 Vis. at 210° D	20.00	20.00
150-160 Vis. at 210° D:		
0 to 10 p.p.	17.00	17.00
10 to 25 p.p.	16.00	16.00
25 to 40 p.p.	16.00	16.00
150-160 vis. at 210° E	16.00	16.00



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ment of this oil as kerosine was slow. A good portion of the oil which normally would have been sold as kerosine was being marketed as range oil, sellers here said. Prices for kerosine and range oil generally were at 4 cents and up.

California

Trading Light

N. P. N. News Bureau

LOS ANGELES, Nov. 27.—California petroleum markets showed the effect of Thanksgiving feasting; being dull and listless. No active inquiry was reported for bulk quantities and current quotations remained practically unchanged. A certain uneasiness in suppliers ideas of prices for cargo lots of gasoline continued to be in evidence.

Last week's opening of bids for U. S. Navy fuel oil business on the west coast were reviewed by some suppliers, who deduced that prices on Grade C fuel in bulk might be lowered under the 85 cents a barrel low on current quotations.

Although it could not be confirmed, reports from active suppliers indicated some fuel oil for bunkering at San Pedro had been offered at 97.5 cents by an independent and at $1.00 by a member of the so-called major group. This compares with $1.075 and $1.10 currently quoted by independents and majors, respectively, on this product.

Prices for natural gasoline were higher at 7.5 to 7.75 cents a gallon, with some suppliers asking 8 cents.

Colder weather boosted the demand for burning oils. In general, however, spot quotations remained unchanged.

Coastal

Small Cargo Sold

N. P. N. News Bureau

NEW YORK, Nov. 29. — Cargo markets at the Gulf were quiet the past week. Trading was restricted due to Thanksgiving Day.

Only one gasoline cargo was reported sold in the open market. The sale involved approximately 25,000 barrels of above 65 octane gasoline for prompt coastwise lifting at 5.875 cents a gallon, f.o.b. the Gulf.

Several export inquiries for 64-66, 375 e.p. gasoline were in the market but no transactions were reported closed. Quotations generally heard on this grade were at 5.625 cents, f.o.b. the Gulf.

The coastwise market for boats for gasoline, kerosine or No. 2 fuel oil shipment rose during the week, traders reported. One boat was reported fixed Nov. 26 for December movement of gasoline at 30 cents a barrel for Gulf to North Atlantic lifting, an increase of 5 cents a barrel over the previous fixture. Traders attributed this upward movement in prices of "clean" boats to a better call for kerosine and light

(*Continued on page 52*)

Fuel Oil . . . . .

TULSA, Nov. 29. — Prices for Mid-Continent light fuels tightened considerably the past week, according to some buyers. This especially was true of resale prices, some reports indicating 0.125-cent advances. Prices direct to distributors were unchanged, although quotations at the highs of the price ranges were more numerous. Light fuel supplies still were closely held by refiners and only small lots were offered in the open market. Several refiners, short of light fuels, were in the market as buyers.

The heavy fuel situation was unchanged, with stocks reported accumulating at some refineries. Railroads, however, were taking out the reduced output of some plants. Industrial demand was light.

* * *

NEW YORK, Nov. 29. — Consumer demand for home burner oils increased considerably along the eastern seaboard the past week, distributors reported, as colder weather prevailed. This was particularly true during the early days of the week, they said.

Improved demand for retail deliveries of kerosine and light fuel oils was reflected, although to a lesser extent, in tank car and barge movements from deepwater terminals, suppliers reported.

No changes were reported in tank car or barge prices for light fuel oils, although some distributors reported improvement in tank wagon markets in some districts.

* * *

CHICAGO, Nov. 29. — Heavy grades featured the fuel oil market in the middle west. Industrial demand in the Chicago and Michigan areas continued to decline. Stocks were increasing and prices continued downward.

This was especially true in Michigan. One refiner was operating at two-thirds of capacity because he had no market for heavy fuel and limited storage space. An unconfirmed report was that another refinery had shut down because of limited storage and over-supply of heavy fuel. Out-of-state shipments, which generally provide a good market, were virtually at a standstill, as were shipments to Michigan automotive plants.

Little change was noted in light grades of fuel. Offerings continued limited, with prices firm.

To Post Dealer Prices

CHICAGO, Nov. 29.—Effective Nov. 30, Standard Oil Co. of Indiana will discontinue contracts with dealers for Stanolind stove and lighting naphtha, which contracts provide for a discount off the tank wagon price, and effective Dec. 1, it will post a price to dealers on this product. This price will be 1.5 cents per gallon below the normal tank wagon price.

TANK WAGON MARKETS, HEATING OILS

Prices in Effect Nov. 29, 1937

Following are tank wagon prices of various grades of heating oil at the points shown in various territories. Prices are in cents per gallon.

	No. 1	No. 2	No. 3	No. 4
S. O. NEW JERSEY				
Newark, N. J.	*	7.00	7.00	7.00
Atlantic City, N. J.	*	7.00	7.00	7.00
Baltimore, Md.	8.00	7.00	7.00	7.00
Washington, D. C.	8.50	7.75	7.75	7.75
SOCONY-VACUUM OIL CO. INC (S. O. New York Division)				
New York City	*	7.50	7.50	7.50
Albany, N. Y.	*	7.50	7.50	7.50
Rochester, N. Y.	*	7.50	7.50	7.50
Boston, Mass.	*	7.00	7.00	7.00
Bangor, Me.	*	8.00	8.00	8.00
Manchester, N. H.	*	8.00	8.00	8.00
Burlington, Vt.	*	8.00	8.00	8.00
New Haven, Conn.	*	7.50	7.50	7.50
Providence, R. I.	*	7	7	7

*Prices for No. 1 fuel in S. O. New Jersey and Socony-Vacuum territories same as for kerosine, which see in tank wagon table for various cities; prices change with kerosine

	No. 1	No. 2	No. 3	No. 4
ATLANTIC REFINING				
Philadelphia, Pa.	7 75	7 00	7.00	7.00
Allentown, Pa.	7 75	7.00	7.00	7 00
Wilmington, Del.	8 25	7.50	7.50	7.50
Springfield, Mass.	9 00	7.50	....	7.50
Worcester, Mass.	9 00	7 50	....	7.50
Hartford, Conn.	9 00	7 50	....	7.50

S. O. OHIO

*Ohio Statewide	8.00	8.00	7.50	6 75

Note: S. O. Ohio prices are for hose dumps; bucket dumps are 0.5c per gallon higher.

*Except Cleveland Division and City of Toledo. In Cleveland Division (Cuyahoga, Lake and Geauga counties), No. 1 price is same as statewide; Nos. 2, 3 and 4 are 0.5c higher; No. 5 is priced 0.25c lower than No. 4. In Toledo No. 2 is 0.5c lower than statewide, others same.

S. O. INDIANA

Stanolex Fuel and Furnace Oils

	No. 1 Fuel	Stanolex Furnace
Chicago	†8.8	7.00
Indianapolis	....	*11.8
Detroit	....	7.1
Milwaukee	8.1	7.4
Minneapolis	7.5	7.5
Sioux City	7.2	7.2
St. Louis	7.5	6.8
Kansas City	6.6	6.6

*Includes state tax of 4c.

†This price applies to 1 to 99 gals. deliveries; 150 gals. and over, 7c.

Note: Small-lot deliveries of light fuel oils range up to 2c higher than above quotations.

REFINERY TANK CAR MARKETS

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days) unless otherwise stated. Prices in cents per gallon, except heavy fuel oils in dollars per barrel, tank car lots, f.o.b. refineries in districts designated, except where otherwise noted. Inter-refinery and export prices not included, unless so stated in the respective markets. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude. Unless otherwise noted, gasoline octane ratings are determined by C.F.R. Motor method, A.S.T.M. D-357-33T; and lubricating oil specifications determined according to A.S.T.M. methods, unless otherwise noted.

Cylinder Stocks (cont'd)

Prices Effective	Nov. 29	Nov. 22
Mid-Continent (cont'd)		
120 Vis. at 210° D:		
0 to 10 p.p.	16.00	16.00
10 to 25 p.p.	15.50	15.50
25 to 40 p.p.	15.125	15.125
600 S.R. Dark Green	5.00 – 7.50	5.00 – 7.50
600 S.R. Olive Green	7.00 – 9.50	7.00 – 9.50
631 S.R.	‡14.00	‡14.00
Black Oil	3.50 – 4.00	3.50 – 4.00
CHICAGO (Viscosity at 210°)		
Unfiltered Steam Refined:		
140	9.00	9.00
160	10.00	10.00
200	11.00	11.00
Bright stocks, 160 vis. at 210. No. 8 color:		
0 to 10 p.p.	18.75	18.75
15 to 25 p.p.	17.75	17.75
30 to 40 p.p.	17.25	17.25
E filtered Cyl. Stock	14.50	14.50

To obtain prices delivered in Chicago, add 0.25c per gal.

‡Only one refiner quoting.

Prices Effective	Nov. 29	Nov. 22
WESTERN PENNA.		
600 S.R. filterable	8.00 – 9.50	8.00 – 9.50
650 S.R.	11.50 –13.00	11.50 –13.00
600 fl.	12.00 –14.00	12.00 –14.00
630 fl.	16.00 –17.00	16.00 –17.00
600 Warren E	13.00 –14.00	13.00 –14.00
Bright stock, 145-155 vis. at 210°, 540-550 flash, No. 8 color:		
10 p.t.	19.00 –19.50	19.00 –19.50
15 p.t.	18.00 –18.50	18.00 –18.50
20 p.t.	17.00 –17.50	17.00 –17.50
25 p.t.	16.00 –16.50	16.00 –16.50

Petrolatums

WESTERN PENNA. (Per lb., in barrels, carload lots. In tank cars, 0.5c per lb. less).

Snow white	6.625– 6.75	6.625– 6.75
Lily White	5.625– 5.75	5.625– 5.75
Cream White	4.625– 4.75	4.625– 4.75
Light Amber	2.75 – 2.875	2.75 – 2.875
Amber	2.50 – 2.625	2.50 – 2.625
Red	2.125– 2.375	2.125– 2.375

Wax

Prices Effective	Nov. 29	Nov. 22
WESTERN PENNA. (Per lb., f.o.b. N. Y. basis)		
122-124 w.c. scale, A.m.p.	2.95 – 3.00	2.95 – 3.00
124-126 w.c. scale, A.m.p.	2.95 – 3.00	2.95 – 3.00
OKLAHOMA (Per lb. in bbls.; in a few instances, per lb. in burlap bags).		
124-126 w.c. scale, A.m.p.	3.00	3.00
CHICAGO (In bags, carload lots. Melting points are E.M.P. (A.S.T.M.) methods; add 3° F. to convert into A.m.p.)		
Fully refined:		
122-124	4.65 – 4.75	4.65 – 4.75
125-127	4.90 – 5.00	4.90 – 5.00
127-129	5.05 – 5.15	5.05 – 5.15
130-132	**5.45 – 5.55	**5.45 – 5.55
132-134	**5.70 – 5.80	**5.70 – 5.80
135-137	**6.45 – 6.55	**6.45 – 6.55

**Same prices quoted in bags or slabs loose.

MID-WESTERN TANK CAR MARKET

Prices are those made by Chicago sellers, on Group 3 (Oklahoma) freight basis, although shipments may originate in other South-western or Mid-western refining districts

Gasoline

Prices Effective	Nov. 29	Nov. 22
U. S. Motor: (a) (Octane Test L-3)		
62 oct. and below	3.875– 4.25	4.00 – 4.50
63-66 oct.	4.25 – 4.75	.....
67-69 oct.	4.50 – 5.00	.....
70-72 oct.	4.75 – 5.25	.....
60-62, 400 e.p.	4.00 – 4.50	4.00 – 4.50
64-66, 375 e.p.	**5.00	**5.00
68-70, 350-360 e.p.	**5.25	**5.25

(a) For footnote, see footnote, 1st column, 1st page of Refinery Markets.

Kerosine

41-43 w.w.	4.00 – 4.25	4.00 – 4.25
42-44 w.w.	4.125– 4.375	4.125– 4.375

**One seller quoting.

Fuel *and* Gas Oils

Prices Effective	Nov. 29	Nov. 22
Domestic:		
No. 1 p.w.	4.00 – 4.125	4.00 – 4.125
No. 1 straw	3.875– 4.00	3.875– 4.00
No. 2 straw	3.75 – 3.875	3.75 – 3.875
No. 2 dark	3.50 – 3.625	3.50 – 3.625
No. 3	3.375– 3.50	3.375– 3.50
No. 4	$1.05 –$1.10	$1.05 –$1.10
No. 5	$0.80 –$0.85	$0.80 –$0.85
Range oil	4.00 – 4.125	4.00 – 4.125
Industrial:		
No. 4	$0.95 –$1.10	$0.95 –$1.10
No. 5	$0.775–$0.85	$0.775–$0.85

Prices Effective	Nov. 29	Nov. 22
Industrial (cont'd)		
No. 6	$0.55 –$0.65	$0.55 –$0.65
U. G. I. gas oil	2.875– 3.25	2.875– 3.25

Naphtha and Solvent

Stoddard solvent	6.875	6.875
Cleaners' naphtha	7.375	7.375
V. M. & P. naphtha	7.375	7.375
Mineral spirits	6.375	6.375
Rubber solvent	7.375	7.375
Lacquer diluent	8.375	8.375

DAILY GASOLINE PRICES

Daily range of gasoline prices as reported in PLATT'S OILGRAM, (Week Ended Nov. 26, 1937)

	Nov. 22	Nov. 23	Nov. 24	Nov. 26
U. S. Motor, (Octane Number determined according to L-3 Method):				
62 octane and below:				
Oklahoma	4.125– 4.375	4.125– 4.375	4.125– 4.375	4.125– 4.375
*North Texas	†4.50 – 4.875	†4.50 – 4.875	†4.50 – 4.875	†4.50 – 4.875
West Texas	4.625– 4.75	4.625– 4.75	4.625– 4.75	4.625– 4.75
63-66 octane:				
Oklahoma	4.50 – 4.75	4.50 – 4.75	4.50 – 4.75	4.50 – 4.75
*North Texas	†5.00 – 5.375	†5.00 – 5.375	†5.00 – 5.375	†5.00 – 5.375
West Texas	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25
67-69 octane:				
Oklahoma	4.875– 5.125	4.875– 5.125	4.875– 5.125	4.875– 5.125
*North Texas	†5.375– 5.75	†5.375– 5.75	†5.375– 5.75	†5.375– 5.75
West Texas	5.50 – 5.625	5.50 – 5.625	5.50 – 5.625	5.50 – 5.625
70-72 octane:				
Oklahoma	5.25 – 5.50	5.25 – 5.50	5.25 – 5.50	5.25 – 5.50
*North Texas	†5.625– 6.00	†5.625– 6.00	†5.625– 6.00	†5.625– 6.00
West Texas	5.875	5.875	5.875	5.875
U. S. Motor, Mid-Western Market (Group 3 Basis):				
62 octane and below	4.00 – 4.50	4.00 – 4.50	4.00 – 4.50	3.875– 4.25
63-67 octane	4.25 – 5.00	4.25 – 5.00	4.25 – 5.00	4.25 – 4.75
68-70 octane (regular)	4.75 – 5.50	4.75 – 5.50	4.75 – 5.50	4.50 – 5.125
Motor Gasoline, 60-64 oct.				
New York harbor	†7.00 – 7.25	†7.00 – 7.25	†7.00	†7.00
Philadelphia district	†7.00 – 7.25	†7.00 – 7.25	†7.00	†7.00
Baltimore district	†7.00 – 7.25	†7.00 – 7.25	†7.00 – 7.25	†7.00 – 7.25
Motor Gasoline, 65 oct. & above				
New York harbor	†7.25 – 7.50	†7.25 – 7.50	†7.25	†7.25
Philadelphia district	†7.25 – 7.50	†7.25 – 7.50	†7.25	†7.25
Baltimore district	†7.25 – 7.50	†7.25 – 7.50	†7.25 – 7.50	†7.25 – 7.50
U. S. Motor, 58-62°				
Bradford-Warren (Western Penna.)	6.00 – 6.125	6.00 – 6.125	6.00 – 6.125	6.00 – 6.125
Other districts (Western Penna.)	5.00 – 5.25	5.00 – 5.25	5.00 – 5.25	5.00 – 5.25
Motor Gasoline, Min. 65 oct.				
Bradford-Warren (Western Penna.)	†7.25 – 7.50	†7.25 – 7.50	†7.25 – 7.50	7.25 – 7.50
Other districts (Western Penna.)	7.25 – 7.875	7.25 – 7.875	7.25 – 7.875	7.25 – 7.875

*For shipment to Texas and New Mexico destinations; Group 3 prices are quoted on northern shipment.
†Nominal.

TANK WAGON MARKETS

Tax column includes 1c federal tax, state gasoline tax, also city and county taxes as indicated in footnotes, and inspection fees, as shown in general footnote. These prices in effect Nov. 29, 1937, as posted by principal marketing companies at their headquarters offices, but subject to later corrections

S. O. New Jersey

ESSOLENE

	Consumer Tank Car	Dealer T.W.	Taxes	Posted S.S.	Kerosine T.W.
Atlantic City, N. J.	7.25	8.75	4	*	9
Newark, N. J.	7.25	8.75	4	*	9
Annapolis, Md.	8.35	9.85	5	*	9.5
Baltimore, Md.	7.75	9.25	5	17.8	9
Cumberland, Md.	9.15	11.65	5	*	10
Washington, D. C.	8	9.5	3	16	9.5
Danville, Va.	8.95	11.45	6	*	12.9
Norfolk, Va.	7.75	10.25	6	*	11.5
Petersburg, Va.	8.05	10.55	6	*	11.7
Richmond, Va.	8.05	10.55	6	*	11.7
Roanoke, Va.	9.25	11.75	6	*	12.9
Charleston, W. Va.	8.55	11.05	6	*	12.6
Parkersburg, W. Va.	7.85	10.35	6	*	11.2
Wheeling, W. Va.	8.75	11	6	*	12.2
Charlotte, N. C.	9.15	11.65	7	*	12.6
Hickory, N. C.	9.65	12.15	7	*	13
Mt. Airy, N. C.	9.45	11.95	7	*	12.8
Raleigh, N. C.	8.75	11.25	7	*	12.1
Salisbury, N. C.	9.25	11.75	7	*	12.7
Charleston, S. C.	7.75	10.25	7	*	11.1
Columbia, S. C.	8.75	11.25	7	*	12.1
Spartanburg, S. C.	9.45	11.95	7	*	12.9

*S. O. New Jersey transferred stations to dealers: no prices available.

Price basis to undivided dealers: Dealer t.w. price less 0.5c per gal.

Price basis to commercial consumers: To contract accounts, purchasing at least one full compartment at a time by hose connection: Effective March 12, 1937, in New Jersey, and March 8 in Maryland, District of Columbia, and in Arlington and Fairfax Counties in Virginia, on yearly purchases: from 2,500 to 100,000 gals., consumer t.w. price at time and place of delivery; 100,000 gals. per year consumer tank car price, plus 0.5c per gal. Generally consumer t.w. price in foregoing states is equivalent of dealer t.w. price, less 0.5c per gal.

Effective May 15, 1937, on Essolene and Esso (by tank wagon) in North and South Carolina, West Virginia and Virginia (except Arlington and Fairfax Counties, which see above), commercial consumers taking deliveries of 50 gals. (West Va. 100 gals.) or more at one time will be billed at the posted consumer t.w. price. Deliveries less than 50 gals. (West Va. 100 gals.) will be billed at 4c per gal. over posted consumer t.w. price. Generally, posted consumer t.w. price will be equivalent to the dealer price less 0.5c per gal.

Kerosine Discount: 1c off t.w. price for 25 gals or more, under contract thru territory (Baltimore City contract not necessary) except no discount in state of New Jersey.

Socony-Vacuum Oil Co., Inc.

(S. O. New York Division)

SOCONY MOBILGAS

	Consumer Tank Car	"Split" Dealer T.W.	Taxes	Total "Split" Dealer T.W.	Kerosine T.W.
Metropolitan N. Y. City: Boroughs of Manhattan, Bronx and Brooklyn (Kings and Queens)	8	9.5	*5	14.5	9
Borough of Richmond (Staten Is.)	8	9.5	*5	14.5	9
Albany, N. Y.	8	9.5	5	14.5	9
Binghamton, N. Y.	8.75	10.3	5	15.3	9
Buffalo, N. Y.	8.54	10.05	5	15.05	8.5
Jamestown, N. Y.	8.28	10.8	5	15.8	8.25
Plattsburg, N. Y.	8.4	10.4	5	15.4	9.5
Rochester, N. Y.	8.67	10	5	15	8.5
Syracuse, N. Y.	8.62	10	5	15	9.5
Danbury, Conn.	8.3	9.8	4	13.8	9
Hartford, Conn.	8.1	9.6	4	13.6	9
New Haven, Conn.	8	9.5	4	13.5	9
Bangor, Me.	8.6	8.8	5	13.8	9.5
Portland, Me.	8	9.8	5	14.8	8.75
Boston, Mass.	8	9	4	13	8.5
Concord, N. H.	8.7	11.3	5	16.3	9.5
Lancaster, N. H.	9.6	12.3	5	17.3	10.25
Manchester, N. H.	8.5	10.8	5	15.8	9.5
Providence, R. I.	8	9.5	4	13.5	8.5
Burlington, Vt.	8.4	10.4	5	15.4	9.5
Rutland, Vt.	8.7	10.7	5	15.7	9

*Plus 2% city sales tax computed at time of each sale.

Note: Socony-Vacuum has transferred all service stations to dealers; no prices available.

Price basis to undivided dealers: 0.5c less than "split" dealer t.w.

Price basis to commercial consumers: Effective about Nov. 15, 1936 in New York and New England, for tank wagon delivery: monthly purchases of 25,000 gals. or over, pay consumer tank car price at point of delivery, plus 0.5c gal.; monthly purchases of 5,000 to 25,000 gals., pay undivided dealer tank wagon price at point of delivery; monthly purchases of less than 5,000 gals., pay divided dealer tank wagon price at point of delivery. Private consumers pay undivided dealer tank wagon price at point of delivery, plus 2c gal.

Atlantic Refining

ATLANTIC WHITE FLASH GASOLINE

	Commercial Tank Car	All Tax	Total Dealer T.W	S.S.	Kerosine T.W.
Philadelphia, Pa.	7.25	5	13.75	17	10.5
Pittsburgh	8	5	15	20	11
Allentown	7.75	5	14.25	**	11
Erie	8	5	14.5	**	10
Scranton	8	5	14.5	**	11
Altoona	8	5	15	**	11
Harrisburg	7.5	5	14	**	11
Williamsport	8	5	15	**	11
Dover, Del	...	5	14.5	**	11
Wilmington	...	5	14	**	11
Boston, Mass	...	4	13	**	8.5
Springfield, Mass	...	4	13.3	**	8.5
Worcester, Mass	...	4	14.3	**	9
Fall River, Mass	...	4	12.5	**	8.5
Hartford, Conn	...	4	13.6	**	9
New Haven, Conn	...	4	13.5	**	9
Providence, R. I.	...	4	13.5	**	8.5
Atlantic City, N. J.	...	4	12.75	**	9
Camden, N. J.	...	4	12.75	**	9
Trenton, N. J.	...	4	12.75	**	9
Annapolis, Md.	...	5	14.85	**	9.5
Baltimore, Md.	...	5	14.25	**	9
Hagerstown, Md.	...	5	15.25	**	10
Richmond, Va.	...	6	16.55	**	11.7
Wilmington, N. C.	...	7	17.35	**	11.3
Brunswick, Ga.	...	7	16	**	*13
Jacksonville, Fla.	...	8	17	**	10

*Georgia has kerosine tax of 1c per gal., not included in above price.

**Atlantic Refining transferred stations to dealers; no prices available.

Price basis to undivided dealers: Dealer t.w. less 0.5c per gal

Price basis to commercial consumers: in Penna. and Delaware, effective Mar. 11, 1937, on yearly gasoline purchases to contract accounts taking full compartment hose deliveries, using 100,000 gals. or more per year, tank car price plus 0.5c per gal.; consumers taking less than 100,000 gals., undivided dealer price. Consumers under contract and not under contract, taking less than full compartment delivery, and consumers not under contract taking full compartment delivery, get divided dealer price. Consumers taking less than 25 gals., t.w delivery, get 4c above undivided dealer price.

Discount on kerosine: Effective Oct. 29, 1936, in Pennsylvania and Delaware. 2c per gal. off t.w. price on t.w. deliveries of 25 gals. or more at one time.

S. O. Ohio

SOHIO X-70 GASOLINE

	All Tax	**Commercial T.W.	†Divided Dlr.	Kerosine T.W.
Ohio State-Wide	5	16.5	15.5	*13
Allen, Auglaize, Champaign, Darke, Geauga, Logan, Lorain, Mercer, Putnam, Shelby and Van Wert counties:	5	16.5	15	....
Defiance county	5	15.5	14.5	....
Counties where prices are below statewide:				
Columbiana and Pickaway	5	16	15	....
Franklin and Knox	5	15.5	14.5	....
Paulding	5	15	13.5	14	....

RENOWN GASOLINE (Third Grade)

Ohio State-Wide	5	16	15	....
Allen, Auglaize, Champaign, Geauga, Logan, Lorain, Mercer, Putnam, Shelby and Van Wert counties:	5	16	14.5	15	....
Defiance county	5	15	....	....	....
Erie, Fulton, Lucas, Ottawa, Sandusky, Williams and Wood	5	16	....	15	....
Hamilton county	5	16.5	....	15.5	....
Counties where prices are below statewide:					
Columbiana and Pickaway	5	15.5	....	14.5	....
Franklin and Knox	5	15	....	14	....
Paulding	5	14.5	13	13.5	....
Counties where prices are above statewide: Butler, Clermont, Greene, Miami, Montgomery, Preble and Warren	5	16.5	....	15.5	....
Darke county	5	16.5	15	15.5	....

S. O. Ohio Cont'd

KEROSINE PRICES

(Off Statewide Level)

Kerosine prices are off statewide level in the following counties:

Allen, Auglaize, Champaign, Columbiana, Darke, Geauga, Greene, Hardin, Logan, Mahoning, Mercer, Preble, Putnam, Shelby, Trumbull, Union, Van Wert and Wyandot: *12.5
Paulding *12
Ashtabula *11.5
Fayette, Licking, Madison, Pickaway, Portage and Summit *9.5

*Kerosine prices include 1c state tax.

**Commercial consumer t.w. posted price discontinued statewide, Oct. 20, 1937, except in 11 counties, these being: Allen, Auglaize, Champaign, Darke, Logan, Lorain, Mercer, Paulding, Putnam, Shelby and Van Wert.

Commercial Tank Wagon Q.D.A. to contract accounts: Effective Oct. 20, 1937, thru Ohio (except in 23 counties), on monthly purchases, off posted consumer t.w. price: 0 to 999 gals., 1c; 1,000 to 19,999 gals., 1.5c; 20,000 gals. and over, 2.5c. The 23 counties where Q.D.A. differs from statewide are: Allen, Auglaize, Champaign, Darke, Defiance, Erie, Fulton, Hamilton, Henry, Logan, Lorain Lucas, Meigs, Mercer, Ottawa, Paulding, Putnam, Sandusky, Scioto, Shelby, Van Wert, Williams and Wood.

†This price also to authorized agents, exclusive of 0.5c rental.

Sales tax: Ohio's 3% sales tax, effective Jan. 27, 1935, is added "where assessable, to regular posted prices", S. O Ohio says.

On kerosine, prices to resellers and commercial consumers are posted generally at 3c per gal. below consumer t.w. price in any quantity, when such prices are on state-wide level.

S. O. Kentucky

CROWN GASOLINE

(Regular Grade)

	Consumer T.W.	All Tax	Total Consumer T.W.	Net Dlr.	Kerosine T.W
Covington, Ky.	13	6	19	16	11
Lexington, Ky.	13.5	6	19.5	16.5	11
Louisville, Ky.	13	6	19	16	10.5
Paducah, Ky.	13.5	6	19.5	16.5	10
Jackson, Miss.	13	7	20	17	*13
Vicksburg, Miss.	13	7	20	17	*13
Birmingham, Ala.	14	*8	22	19	12
Mobile, Ala.	13	*9	22	19	11
Montgomery, Ala.	13	*9	22	19	*14.5
Atlanta, Ga.	14	7	21	18	*12
Augusta, Ga.	14	7	21	18	*14
Macon, Ga.	14.5	7	21.5	18.5	*14.5
Savannah, Ga.	12	7	19	16	*12
Jacksonville, Fla.	12	8	20	17	10
Miami, Fla.	12.5	8	20.5	17.5	12.5
Pensacola, Fla.	13	*9	22	19	12
Tampa, Fla.	11	8	19	16	10.5

KYSO GASOLINE

(Third Grade)

Covington, Ky.	11	6	17	14.5	....
Lexington, Ky.	11.5	6	17.5	15	....
Louisville, Ky.	11	6	17	14.5	....
Jackson, Miss.	11.5	7	18.5	16	....
Vicksburg, Miss.	11.5	7	18.5	16	....
Birmingham, Ala.	12	*8	20	17.5	....
Mobile, Ala.	10.5	*9	19.5	17	....
Montgomery, Ala.	10.5	*9	19.5	17	....
Atlanta, Ga.	12	7	19	16.5	....
Augusta, Ga.	12	7	19	16.5	....
Macon, Ga.	12.5	7	19.5	17	....
Savannah, Ga.	9.5	7	16.5	14	....
Pensacola, Fla.	11	*9	20	17.5	....

Discounts to all tank wagon consumers: Effective Jan. 4, 1937, thru territory, on Crown gasoline, 3c per gal. below consumer t.w. price; on Kyso, 2.5c below, regardless of quantity purchased, per month.

Discounts on kerosine: Prices in Kentucky are net, but in other states subject to 2c discount.

**Taxes*: in the tax column is included these city and county gasoline taxes at the following points: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Mississippi kerosine prices include 1c state tax. Montgomery kerosine price includes 1c city tax.

Above prices include these inspection fees on both gasoline and kerosine, per gallon, figured on basis of 50 gallons per barrel:

Alabama, 1/40c on gasoline, 1/2c on kerosine; Arkansas, 1/5c per gal. in a single barrel. 1/20c per gal. in bulk; Florida, 1/8c; Illinois, 3/100c; Indiana, 1/2c per gal. in a single barrel; 3/10c per gal. in lots of 2 to 10 bbls., 1/5c for 10 to 50 bbls., 2/25c for over 50 bbls.; Kansas, 1/50c, (3/50c can be charged to meet inspection department expenses); Louisiana, 1/32c; Minnesota, 1/25c; Missouri, 3/100c; Nebraska, 3/100c; Nevada, gasoline, 1/20c; North Carolina, 1/4c; North Dakota, 1/20c; Oklahoma, 2/25c per gal., in lots of more than 50 bbls., 1/5c in lots less than 50 bbls.; South Carolina, 1/8c; South Dakota, 1/10c; Tennessee, 2/5c; and Wisconsin, 1/25c.

Kerosine inspection fee only: Iowa, 2/25c; Michigan, 4/5c per gal. for first 2 bbls.; 3/5c for next 3; 2/5c for next 5; 3/10c for next 15, and 1/5c per gal. in lots over 25 bbls

TANK WAGON MARKETS

Tax column includes 1c federal tax, state gasoline tax, also city and county taxes as indicated in footnotes, and inspection fees, as shown in general footnote. These prices in effect Nov. 29, 1937, as posted by principal marketing companies at their headquarters offices, but subject to later corrections

S. O. Indiana

	Red Crown Tax	Dealer Prices Red Crown Total T.W.	Stanolind T.W.	Kerosine T.W.
Chicago, Ill.	4	15.3	13.3	12.1	10.2
Decatur, Ill.	4	15.3	13.8	13.1	10.2
Joliet, Ill.	4	15.3	13.8	13.3	10.2
Peoria, Ill.	4	15.3	13.8	13.3	10.2
Quincy, Ill.	4	15.1	13.6	12.5	10
Indianapolis, Ind.	5	16.9	15.4	14.7	*14.8
Evansville, Ind.	5	16.8	15.3	13.1	*14.7
South Bend, Ind.	5	17.2	15.7	14.2	*13.7
Detroit, Mich.	4	15.1	13.6	13.1	9.8
Grand Rapids, Mich.	4	16.3	14.8	14.3	11
Saginaw, Mich.	4	16.1	14.6	14.1	8.6
Green Bay, Wis.	5	17	15.5	14.8	10.9
Milwaukee, Wis.	5	16.5	15	14.2	10.4
La Crosse, Wis.	5	16.7	15.2	14.7	10.6
Minneapolis-St. Paul.	5	16.7	15.2	14.7	10.6
Duluth, Minn.	5	17	15.5	15	10.9
Mankato, Minn.	5	16.7	15.2	14.7	10.6
Des Moines, Ia.	4	15.1	13.6	12.1	*13
Sioux City, Ia.	4	15.3	13.8	13.3	*13.2
Davenport, Ia.	4	15.3	13.8	13.3	*13.2
Mason City, Ia.	4	15.4	13.9	13.4	*13.3
St. Louis, Mo.	*4	14.9	13.4	11.2	9.8
Kansas City, Mo.	*4	14.6	13.1	12.6	8
St. Joseph, Mo.	*4	14.6	12.4	12	8.5
Fargo, N. D.	4	16.7	15.2	14.7	11.6
Minot, N. D.	4	17.9	16.4	15.9	12.8
Huron, S. D.	*5	17.1	15.6	15.1	*11
Wichita, Kans.	4	14.1	12.4	10.5	8

*Taxes: in the tax column is included these city and state gasoline taxes at following points: Kansas City, St. Joseph and St. Louis, 1c city tax; South Dakota, 0.1c sales tax. State Kerosine taxes: Indiana, 4c; Iowa, 3c, all included in above prices.

Discount to commercial consumers: Effective Jan. 1, 1935, thru territory, except Michigan effective Feb. 1, on purchases per month, discount off t.w prices; all gasolines, 25 to 1,000 gals., at t.w. price; 1,000 gals., or more, 1.5c off t.w. on Ethyl and Red Crown, and 1c on Stanolind (latter effective June 9, 1937). Minimum delivery is 25 gals.

S. O. Nebraska

STANDARD RED CROWN GASOLINE

	All Tax	T.W. Total	Dealer Total	Kerosine T.W.
Omaha, Neb.	6	17.7	16.2	10.5
McCook	6	18.1	14.1	10.1
Norfolk	6	18.1	16.6	10.9
North Platte	6	18.5	17	11.3
Scottsbluff	6	19.2	16	12

Discounts to commercial consumers: for tank wagon deliveries covered only by Standard Commercial Consumer Contract, effective January 1, 1935.

S. O. Louisiana

ESSOLENE

	Consumer Tank Car	Dealer T.W.	Taxes	Kerosine T.W.
Little Rock, Ark.	7.75	10.25	7.5	11.5
Alexandria, La.	7.75	10.25	8	*12
Baton Rouge, La.	7.25	9.75	8	*12
New Orleans, La.	7.25	9.75	*10	*13
Lake Charles, La.	8.25	10.75	8	*12.5
Shreveport, La.	6.75	9.25	8	*9.5
Lafayette, La.	8.25	10.75	8	*13
Bristol, Tenn.	10.25	11.5	8	14.5
Chattanooga, Tenn.	9.75	12.25	8	13.5
Knoxville, Tenn.	10.25	12.75	8	14
Memphis, Tenn.	8.25	10.75	8	12
Nashville, Tenn.	9.25	11.75	8	11.5

*New Orleans gasoline tax includes 7c state, 1c federal, and 2c parish tax. Louisiana kerosine prices include 1c state tax; in addition New Orleans has 1c parish tax.

Price basis to dealers: Undivided dealers get dealer price, less 0.5c.

Price basis to commercial consumers: Effective May 15, 1937, thru territory; commercial consumers taking 50 gals. or more at one time will be billed at posted consumer t.w. price; those taking less than 50 gals. at one time will be billed at 4c per gal. over posted consumer t.w. price. Generally, the posted consumer t.w. price will be equivalent to the dealer price less 0.5c per gal.

Humble Oil & Refining Co.

HUMBLE MOTOR FUEL

	*T.W.	Taxes	*Total T.W.	S.S.	Kerosine T.W.
Dallas, Tex.	8.5	5	13.5	17	8
Ft. Worth, Tex.	9	5	14	18	8
Houston, Tex.	9.5	5	14.5	18.5	8
San Antonio, Tex.	9.5	5	14.5	18.5	8

U. S. Motor Gasoline
(Third Grade)

Dallas, Tex.	7	5	12	14
Ft. Worth, Tex.	7.5	5	12.5	15
Houston, Tex.	8.5	5	13.5	16.5
San Antonio, Tex.	8.5	5	13.5	16.5

*Price is t.w. price to all classes of dealers and consumers.

Price basis to "open" dealers: discount off posted retail price: when posted retail price, including all taxes on Esso motor fuel is: 19.1c per gal. and above, discount is 3.5c; 19c to 18.1c, 3c, and 18c and below, 2.5c. Humble motor fuel, 17.1c and above, 3.5c; 17 to 16.1c, 3c; and 16c and below, 2.5c; U. S. motor fuel, 15.1c and above, 2.5c; 15 to 14.1c 2c; and 14c and below, 1.5c.

Continental Oil

	Conoco Bronze Ex-Tax	All Tax	Dealer Prices Total Conoco Bronze	Demand	Kerosine T.W.
Denver, Colo.	11.5	5	16.5	15.5	11.5
Grand Junc., Colo.	14	5	19	18	15
Pueblo, Colo.	11	5	16	14	10.5
Casper, Wyo.	12	5	17	16	11.5
Cheyenne, Wyo.	11	5	16	11	13
Billings, Mont.	13.5	6	19.5	18	15.5
Butte, Mont.	13.5	6	19.5	16.5	15.5
Great Falls, Mont.	13.5	6	19.5	18.5	15.5
Helena, Mont.	13.5	6	19.5	18.5	15.5
Salt Lake City, Utah	14.5	5	19.5	16.5	16
Boise, Ida.	15.5	6	21.5	20.5	18
Twin Falls, Ida.	15	6	21	20	18
Albuquerque, N. M.	11	†6.5	17.5	16.5	12
Roswell, N. M.	11	†6.5	17.5	15	10.5
Santa Fe, N. M.	12	*7	19	16.5	12
Muskogee, Okla.	9.5	5	14.5	13	7
Oklahoma City, Okla.	9	5	14	11	8
Tulsa, Okla.	9	5	14	11	6
Ft. Smith, Ark.	9.75	5	14.75	13.5	8
Little Rock, Ark.	9.75	7.5	17.25	15.125	9.5
Texarkana, Ark.	9.5	5	14.5	12.5	8.5

†Includes city tax of 0.5c.
*Includes 1c city tax.

S. O. California

STANDARD GASOLINE

	T.W.	Taxes	Total T.W.	S.S.	Kerosine T.W.
San Francisco, Cal.	13.5	4	17.5	18.5	11.5
Los Angeles, Cal.	13	4	17	18	9
Fresno, Cal.	14.5	4	18.5	19.5	12
Phoenix, Ariz.	15	6	21	22	†16
Reno, Nev.	15	5	20	21	13
Portland, Ore.	14	6	20	21	13.5
Seattle, Wash.	14	6	20	21	13.5
Spokane, Wash.	17	6	23	24	16.5
Tacoma, Wash.	14	6	20	21	13.5

FLIGHT GASOLINE
(Third Grade)

San Francisco, Cal.	12	4	16	17	....
Los Angeles, Cal.	11.5	4	15.5	16.5	....
Fresno, Cal.	13	4	17	18	....
Reno, Nev.	13.5	5	18.5	19.5	....
Phoenix, Ariz.	13.5	6	19.5	20.5	....
Portland, Ore.	12.5	6	18.5	19.5	....
Seattle, Wash.	12.5	6	18.5	19.5	....
Spokane, Wash.	15.5	6	21.5	22.5	....
Tacoma, Wash.	12.5	6	18.5	19.5	....

†Includes 5c state tax.

Discount to dealers: on gasoline, off t.w. price on Standard Ethyl and Standard Gasoline, to 100% dealers, 3c; to split dealers, 2c; on Flight gasoline, both 100% and split dealers, 2c.

On Stanavo Aviation Gasoline, to all classes of dealers, 3c off t.w

To commercial consumers: off tank wagon price: on single deliveries of 40 gallons and over, Stanavo Aviation, Standard Ethyl and Standard Gasolines, 3c. Flight Gasoline, 2c per gallon. Tank wagon delivery, less than 40 gals., 1c per gal. above posted t.w. price.

On kerosine in tank car, transport truck and trailer delivery, 3c off t.w. price; plant deliveries to jobbers, 2.5c below t.w.

Canada

PRICES OF IMPERIAL OIL LTD.

Per Imperial Gallon, which is 1.2 U. S. Gallons

3-STAR IMPERIAL GASOLINE

	T.W.	Taxes	Total T.W.	Kerosine T.W.
Hamilton, Ont.	16	6	22	17
Toronto, Ont.	16	6	22	17
Brandon, Man.	22.8	7	29.8	22.8
Winnipeg, Man.	20.5	7	27.5	20.7
Regina, Sask.	21.5	7	28.5	22
Saskatoon, Sask.	24.3	7	31.3	24.8
Edmonton, Alta.	21	7	28	23
Calgary, Alta.	18.5	7	25.5	20.5
Vancouver B. C.	16	7	23	23
Montreal, Que.	15	6	21	17.5
St. John, N. B.	16	8	24	18.5
Halifax, N. S.	16	8	24	18.5

Note: Imperial Oil Ltd. has completed transfer of service stations to dealers; no s.s. prices available.

Discounts to undivided dealers, 1c off t.w price, except Maritime Provinces where undivided dealers pay t.w. price. Divided dealers pay t.w. price, thru territory

Aviation Gasoline

Following are tank car and/or tank wagon prices of aviation gasoline in principal marketing territories (Stanavo aviation in all territories except where otherwise noted) Tax column includes 1c federal tax, and state tax; also municipal taxes as indicated in footnotes. Prices in first four territories do not include state or federal taxes.

S. O. NEW JERSEY

	*Ethyl T.C.	Tank Car	T.W.
Bayonne, N. J.	19.5	9.5	12.5
Baltimore, Md.	....	10	12.5
Washington, D. C.	....	....	13.1
Richmond, Va.	....	....	14.7
Greensboro, N. C.	....	....	15.7
Raleigh, N. C.	....	....	17.6
Charleston, W. Va.	....	....	12.2

*This is Stanavo Ethyl Aviation Gasolin 100 octane number, tank car price.

COLONIAL BEACON OIL CO.

	T.W.
Brooklyn, N. Y.	12.8
Buffalo, N. Y.	14.5
Boston, Mass.	15

S. O. PENNSYLVANIA

Philadelphia, Pa.	13.6
Pittsburgh, Pa.	14.4

S. O. LOUISIANA

New Orleans, La.	13.3
Shreveport, La.	13.6

Prices in above four territories are on a 74 octane grade aviation gasoline except where otherwise noted. An 80 octane product generally brings 0.5c premium and an 87 octane product, 1.5c premium over the 74 octane grade.

Note: S.s. prices in above four territories are generally 6c over t.w. prices. Above t.w prices are net, with no discounts allowed for quantity purchases. T.w. prices are generally tank car price, plus freight, plus 2.5c per gal.

S. O. OHIO

Thru Ohio

Stanavo Ethyl Aviation

	Consumer T.W.	Tax	Total Consumer T.W.
73 octane	15.5	5	20.5
80 octane	16.5	5	21.5
87 octane	17.5	5	22.5

Discounts: For delivery on contract to hangar operators and resellers: 2c below consumer posted t.w price, shown above

S. O. INDIANA

Stanolind Aviation Gasoline

(73 octane number at Kansas City; 62 octane at other published points)

Chicago, Ill.	14.6	4	18.6
Detroit, Mich.	16.1	4	20.1
Milwaukee, Wisc.	14.8	5	19.8
Minneapolis, Minn.	15	5	20
St. Louis, Mo.	14.2	*3	17.2
Kansas City, Mo.	13.9	*4	17.9
Fargo, N. D.	16	4	20
Huron, S. D.	15.4	5	20.4

*Includes 1c city tax.

HUMBLE OIL & REFINING CO.

	Tank Car
Baytown, Tex. (exclusive of taxes)	8.5

CONTINENTAL OIL CO.

Conoco Special Gasoline Dealer	Tax	Total Dealer
Denver, Colo.	5	19.5
Cheyenne, Wyo.	5	20
Helena, Mont.	6	22.5
Salt Lake City, Utah	5	22.5
Albuquerque, N. M.	*6.5	20.5

*Includes city tax of 0.5c

S. O. CALIFORNIA

	T.W.	Total T.W.
Phoenix, Ariz.	17	23
Los Angeles, Cal.	15	19
San Francisco, Cal.	15.5	19.5
Reno, Nev.	17	22
Portland, Ore.	16	22
Seattle, Wash.	16	22
Spokane, Wash.	19	25

Note: For discounts, etc., see note under Standard and Flight gasoline above

TANK WAGON MARKETS

Tax column includes 1c federal tax, state gasoline tax, also city and county taxes as indicated in footnotes, and inspection fees, as shown in general footnote. These prices in effect Nov. 29, 1937, as posted by principal marketing companies at their headquarters offices but subject to later corrections

Naphtha (In Tank Wagon)

S. O. NEW JERSEY

	Posted Tank Wagon Prices Mineral Spirits	V.M.&P.
Newark, N. J.	11.5	15.5
Baltimore, Md.	15.5	....
Washington, D. C.	15	....

Discounts: Buyers taking following quantities, at one time, get these discounts: Newark, 2c per gal. on 200 gals. or more; less than 200 gals., 0.5c higher price. Baltimore 2c off on 25 to 100 gals. and 3c on over 100 gals. Washington, 2c off to contract buyers.

SOCONY-VACUUM OIL CO

Buffalo, N. Y.	13	14
New York City	10 5	11 5
Rochester, N. Y.	13	15
Syracuse, N. Y.	14	15
Boston, Mass	13 5	14
Bridgeport, Conn	12.5	14
Hartford, Conn	12	13 5
Providence, R. I.	13 5	14 5

ATLANTIC REFINING CO.

Philadelphia, Pa.	11 5	12 5
Lancaster, Pa.	13	14
Pittsburgh, Pa.	12 5	14 5

Note: Prices for Mineral Spirits also apply to Stoddard Solvent; and prices for V.M.&P. Naphtha apply also to Light Cleaners Naphtha

S. O. OHIO

	S.R. Solvent	V.M.&P. Naphtha
Thru Ohio	13 25	13 75

Note: V.M.&P. Naphtha prices also apply on Dry Cleaners naphtha and special Varnolene; Varnolene and Sohio Solvent 0.5c below these prices. Discounts to contract consumers, off t.w. price: 300 to 999 gals., 0.5c; 1,000 to 2,499 gals., 0.75c; 2,500 to 4,999 gals., 1c; 5,000 or more gals., 1.5c.

S. O. INDIANA

(Prices include state and federal taxes)

	Oleum Spirits	V.M.&P. Naphtha	Stanisol
Chicago, Ill.	15 9	16 2	15 6
Detroit, Mich.	19 3	18 3	19 4
Kansas City, Mo.	14 4	15 4	14 4
St. Louis, Mo.	14 7	15 7	14 6
Milwaukee, Wis.	19 3	20 3	19 3
Minneapolis, Minn.	19 5	20 5	18 4

Note: Prices for V. M. & P. apply also to Light Cleaners Naphtha. All prices, with exception of Missouri points, include state tax. Prices shown are base prices, before discounts

Naphtha (In Tank Cars)

In Tank Cars (F. o. b. refinery or seaboard terminal except Ohio, delivered price.)

	V.M.&P. Naphtha	Solvent
Baltimore	11	10
New York Harbor	10.5-11	9.00-9.5
Philadelphia district	11	10
Boston	10.5	10
Providence	10.5	10
Ohio points, delivered	9.375	*8.50

*This is on rubber solvent.

Note: In Ohio, prices on D.C. naphtha and special Varnolene are same as V.M.&P.; on Varnolene and Sohio Solvent, prices are 0.5c less than on V.M.&P.

Latest Changes

From Nov. 23 to Nov. 29 inclusive. Dates and amounts of changes shown. See table for full current prices.

Continental Oil—Conoco Bronze and Demand:
Consumer and dealer prices cut 0.5c, thru southern Idaho, Nov. 24, except Boise unchanged. Prices at Twin Falls are, Conoco Bronze 21c, and Demand 20c.
Conoco Bronze dealer price cut 1c and Demand dealer price cut 5c, Nov. 23, at Cheyenne.

Corrections

Notation of amount of change and dates not previously shown in table. Table in this issue is corrected to show these changes

S. O. New Jersey—Essolene:
Baltimore, s. s. cut 0.7c, Nov. 16.
Charleston, consumer t. c. should have been 8.55c instead of 8.35c and dealer t. w. 11.05c instead of 10.5c as published, page 58, Nov. 24th issue.
Atlantic Refining—White Flash:
Dealer t. w. cut 0.5c, Fall River, Hartford, New Haven and Providence, Nov. 2.
Dealer t. w. cut 0.75c, thru New Jersey, Maryland, Virginia and North Carolina, Nov. 15.
Dealer t. w. cut 0.5c, Jacksonville, Nov. 15.
Kerosine:
Springfield, t. w. cut 0.5c, Oct. 30.
Jacksonville, t. w. cut 1c, July 31.
S. O. Indiana—Kerosine:
Davenport, t. w. should have been 13.2c, Nov. 17, instead of 13.3c as shown on page 60, Nov. 24 issue.
All gasolines and kerosine:
Duluth unchanged in 0.1c general cut, Nov. 17, reported on page 60, Nov. 24 issue.
Stanolind:
South Bend dealer price cut 1c, Nov. 22.
S. O. Louisiana—Essolene:
Shreveport, consumer t. c. and dealer t. w. cut 0.75c, Nov. 15.
Continental Oil—Conoco Bronze:
Ft. Smith was cut 0.75c in general change, thru Arkansas, Nov. 16, rather than unchanged, as reported on page 60 of Nov. 24 issue. Continental Oil advises.
Texarkana, dealer price cut 1c, Nov. 20.
Demand:
Oklahoma City, dealer price cut 1c, Nov. 22.
In general change, thru Montana, Nov. 13, demand dealer price at Billings was unchanged instead of changed; also both grades of gasoline at Billings and Butte were unchanged, Nov. 22, instead of changed as reported on page 60 of Nov. 24 issue, prices corrected in this issue.

Aviation Gasoline, Naphthas

S. O. Indiana—Stanolind Aviation and T. W. Naphthas:
Up 0.1c, thru territory, due to 1c per cwt. freight rate increase, Nov. 17, except unchanged Kansas City, St. Louis and Milwaukee. This affects Oleum Spirits, V. M. & P. naphtha and Stanisol.

Heating Oils

S. O. Indiana—No. 1 Fuel and Stanolex Furnace Oil:
Up 0.1c, thru territory, due to 1c per cwt. freight rate increase, Nov. 17, except unchanged were Chicago, Indianapolis, Detroit, Minneapolis and St. Louis.

Coastal

(*Continued from page* 48)

fuel oils at Atlantic seaboard terminals, rather than any increased demand for gasoline.

Buyers were showing more interest in gas oil and kerosine, traders said, but none reported any open market sales. The cargo price for No. 2 fuel at the Gulf was firm at 4.5 to 4.625 cents, they said.

Wax

Scale Steady

NEW YORK, Nov. 29.—Crude scale waxes were reported steady, but inactive during the week ended Nov. 27. The situation was little changed from the previous few weeks, traders generally said.

Open market buying continued light, traders reported, although on the other hand they said that suppliers still were not pushing much scale on the market. The result remained a stalemate insofar as price changes were concerned. Occasional sales and offerings were reported ranging from 2.85 to 2.95 cents a pound for the 124-126 white scale.

Fully refined waxes remained unchanged.

Pa. Refinery Lubricating Oil Inventory

(Issued as of Nov. 18 by National Petroleum Assoc.)

	Gallons
1. **Raw Long Residuum** (Including all raw long residuum below, and not salable, as 600 fire)	1,129,281
2. **600 Steam Refined** (Includes all steam refined stock commonly sold or used as 600 and as raw material for bright stocks)	9,141,277
3. **Other Steam Refined** (Not included in 1 and 2, above)	5,727,499
4. **Finished Dewaxed Long Res.**	3,157,281
5. **Bright Stock** (Does not include any material reported in 4, above)	15,260,436
6. **Viscous Neutral,** below 180 vis. but not below 142 vis. @ 100	7,775,450
7. **Viscous Neutral,** 180 vis. @ 100 and above	8,118,863

Build Gathering Line

TULSA, Nov. 22.—White Deer Pipe Line Construction Co. has been awarded a contract for 30 miles of gathering lines to feed the gasoline plant to be built by the Barnsdall Oil Co. near Odessa, Texas, officials of Linde Air Products Co. announced. Twenty-seven miles of pipe from 10 inches to two inches in diameter will be oxy-acetylene welded.

Syracuse Gasoline Cut

CLEVELAND—Effective Nov. 30 Socony-Vacuum Oil Co. reduced dealer tank wagon gasoline prices 0.5 cent at Syracuse, to 9.5 cents for divided dealers and 9 cents for undivided, excluding taxes.

Automotive Notes

(*Continued from page* 44)

A Car is Born . . .

Before some dealers had received their first 1937 cars, two men were putting the 1938 Graham on paper . . . dozens of sketches . . . pads of fragmentary notes and scribblings . . . hour after hour of discussion of sizes, weights, probable competitive prices, sales appeal . . . then the first scale drawings . . . followed by visualization with a quarter-size clay model . . . next full sized blackboard drawings, shaded to give form . . . preliminary drafts from which woodworkers built a full sized wood model of the car . . . detailed drawings, done in aluminum for permanency, were then made of each stamping and casting . . . from these templets were made, followed by the making of various sections of the car in polished mahogany . . . keeping pace were other engineers, improving and refining many mechanical details . . . then, finally, the improved chassis was assembled an old body camouflaged it, and out on the road it went for hundreds of miles of tests . . . then what seemed hopeless confusion now begins to resemble organization . . . new dies are installed . . . materials arrive by truck and trainload . . . and one day a small group of men take their places at the end of the production line to see the first model come off . . . A Car Is Born.

SEABOARD MARKETS, EXPORT AND COASTWISE

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days). In cargo markets, spot shipment is 90 days. Prices in cents per gallon, except heavy fuel oil in dollars per barrel, in tank car lots, f.o.b. refineries or seaboard terminals in districts designated, unless otherwise noted. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude. Unless otherwise noted, gasoline octane ratings are determined by C.F.R. Motor method, A.S.T.M. D-357-33T; and lubricating oil specifications determined according to A.S.T.M. methods, unless otherwise noted.

Eastern Domestic

(Inter-refinery and export prices not included.)

MOTOR GASOLINE

Prices Effective	Nov. 29	
District:	*60-64 Oct.	*65 Oct. & Above
N. Y. harbor	7.00	7.25
†N. Y. harbor	6.75	7.00
Philadelphia	7.00	7.25
Baltimore	7.00 – 7.25	7.25 – 7.50
Norfolk	7.00 – 7.25	7.50
Wilmington, N. C.	7.25	7.50
Charleston, S. C.	7.25	7.50
Savannah	7.25	7.50
Jacksonville	7.25	7.50
Portland	7.50	7.75
Boston	6.75 – 7.00	7.25 – 7.50
Providence	7.00 – 7.25	7.25 – 7.50

*Prices are nominal. †Barge lots.

WATER WHITE KEROSINE

District:			
N. Y. harbor	6.25	Charleston	6.00–6.25
*N. Y. harbor	6.125	Savannah	5.75
Philadelphia	6.25	Jacksonville	5.75
Baltimore	6.25	Portland	6.75
Norfolk	6.00– 6.25	Boston	‡6.25 – 6.40
Wilmington, N. C.	6.25	Providence	6.40

*Barge lots.

†FUEL OILS

	N. Y. harb.	N. Y. harb. barges
No. 1	6.25	6.125
Nos. 2-3	5.25	5.125
No. 4	5.25	5.00 – 5.125
No. 5	$1.45 –$1.55	.....
No. 6	$1.25	.....

	Phila. dist.	Balt. dist.
No. 1	6.25	6.25
Nos. 2-3	5.25	5.25
No. 4	4.75 – 5.25	5.25
No. 5	$1.45–$1.475	$1.45–$1.55
No. 6	$1.25	$1.25

	Bost. dist.	Prov. dist.
No. 1	‡6.25 – 6.40	6.40
Nos. 2-3	5.40	5.40
No. 4	5.40	5.40
No. 5	$1.45–$1.55	.....
No. 6	$1.25	.....

†Fuel oils meet specifications of U. S. Commercial Standards CS12-35

‡Some suppliers quote 6.25c f.o.b. terminal; others 6.40c delivered Boston district.

District:	†Bunker C Fuel	†Diesel Oil
N. Y. harbor	***$1.25	**$2.20
Philadelphia	***$1.25	***$2.10–2.20
Baltimore	***$1.25	**$2.20
Norfolk	*$1.25	$2.20
Charleston	$1.20	$2.20
Savannah	*$1.20	$2.20
Jacksonville	*$1.20	$2.20
Tampa	*$1.20	$2.20
Portland	$1.35	$2.35
Boston	***$1.25	**$2.20
Providence	$1.25	$2.25

†In ships' bunkers.
*For barging add 5c per bbl.
**For barging add 6.5c to 7.5c per bbl.
***For barging add 5c to 6c per bbl.

	Gas Oil 28-34 Gravity	Diesel Oil Shore Plants
N. Y. harbor	5.25	5.25
Philadelphia dist.	5.00	....
Baltimore dist.	5.25	....
Norfolk dist	5.25	....
Savannah dist.	....	5.25
Jacksonville dist.	....	5.25

Pacific Export

(Quotations are at seaboard, Los Angeles, in cargo lots, cents per gal., except where otherwise noted.)

Prices Effective	Nov. 29	Nov. 22
U. S. Motor, under 65 oct.	5.75 – 6.00	5.75 – 6.00
400 e.p. blend, under 65 oct.	6.00 – 6.125	6.00 – 6.125
400 e.p. blend 65 oct. & above	6.125– 6.375	6.125– 6.375
*38-40 w.w. kerosine	4.75 – 5.00	4.75 – 5.00
41-43 w.w. kerosine	5.00 – 5.50	5.00 – 5.50
44 w.w. kerosine	5.50 – 5.75	5.50 – 5.75

*150 fire point

Prices Effective	Nov. 29	Nov. 22
In Cargo lots, per bbl.		
Diesel fuel, 24° & above	$1.45 –$1.50	$1.45 –$1.50
Diesel fuel, under 24°	$1.40 –$1.45	$1.40 –$1.45
*30-34 diesel (gas oil)	$1.55 –$1.65	$1.55 –$1.65
†Grade C fuel oil	$0.85 –$0.90	$0.85 –$0.90

Note: For San Francisco cargo prices, add 5c per bbl. to above cargo prices.

In Ships' Bunkers, or deep tank lots, per bbl.:		
*Diesel fuel oil	$1.625–$1.65	$1.625–$1.65
†Grade C fuel oil	$1.075–$1.10	$1.075–$1.10

*Pacific specification 200. †Pacific specification 400.

Cased Goods: (Per case)		
U. S. Motor	$1.45 –$1.575	$1.45 –$1.575
400 e.p. blend, 65 oct. & above	$1.55 –$1.675	$1.55 –$1.675
*40-43 w.w. kerosine	$1.25 –$1.325	$1.25 –$1.325
Kerosine, p.w.	$1.20 –$1.30	$1.20 –$1.30

*150 fire point.

New York Export

(Prices in cents per gal. in bbls. F.a.s. New York)

CYLINDER OILS (Pennsylvania Products)

Bright stock:		
Light, 25 p.t.	23.50 –24.00	23.50 –24.00
Dark, 25 p.t.	23.00 –23.50	23.00 –23.50
Neutral oil:		
200 3 color, 25 p.t.	26.00 –26.50	28.00 –28.50
150 3 color, 25 p.t.	24.00 –24.50	24.00 –24.50
600 Warren E filtered	20.50 –21.00	20.50 –21.00
600 s.r., unfiltered	15.50 –16.00	15.50 –16.00
650 s.r., unfiltered	19.00 –19.50	19.00 –19.50
600 fl., s.r.	19.50 –20.00	19.50 –20.00
630 fl., s.r.	23.50 –24.00	23.50 –24.00

Wax, Domestic *and* Export

(Prices in cents per lb. Tests made by A. S. T. M. methods. Melting points shown below, however, are A. M. P., 3° higher than A. S. T. M. (E. M. P.) melting points. Export prices are f.a.s. carload lots. Domestic prices are f.o.b. refineries in New York and New Orleans districts, in bags, carload lots, with 0.2c discount allowed for shipment in bulk. Scale, solid and fully refined, slabs in bags.)

Prices Effective	Nov. 29	
	New York	
	Domestic	Export
124-6 Y.C. scale	2.80 – 2.85	2.80 – 2.85
122-4 W.C. scale	2.85 – 2.95	2.85 – 2.95
124-6 W.C. scale	2.85 – 2.95	2.85 – 2.95
123-5 Fully rfd	4.45	4.125– 4.375
125-7 Fully rfd	4.55	4.25 – 4.375
128-30 Fully rfd	4.80	4.50 – 4.625
130-2 Fully rfd	4.95	4.75 – 5.00
133-5 Fully rfd	†5.35	5.25 – 5.375
135-7 Fully rfd	†5.60	5.50 – 5.75
	New Orleans	
	Domestic	Export
124-6 Y.C. scale	2.80 – 2.85	2.80 – 2.85
122-4 W.C. scale	2.85 – 2.95	2.85 – 2.95
124-6 W.C. scale	2.85 – 2.95	2.85 – 2.95
123-5 Fully rfd	4.45	4.125– 4.375
125-7 Fully rfd	4.55	4.25 – 4.375
128-30 Fully rfd	4.80	4.50 – 4.625
130-2 Fully rfd	4.95	4.75 – 5.00
133-5 Fully rfd	†5.35	5.25 – 5.375

†Shipment either in bags or in bulk.

Gulf Coast

(Prices are f.o.b. ship at Gulf oil terminals representing opinions of traders, except prices specified to the contrary. Prices cover bulk shipments of 20,000 bbls. or more, unless otherwise noted.)

Prices Effective	Nov. 29	Nov. 22
For Domestic shipment:		
MOTOR GASOLINE		
59 oct. & below	*5.25 – 5.375	*5.50
60-64 oct. number	*5.375– 5.50	*5.625– 5.75
65 oct. & above	5.875	5.875– 6.00
FUEL OILS		
No. 1	5.25 – 5.375	5.25 – 5.375
No. 2	4.50 – 4.625	4.50 – 4.625
No. 4	4.375– 4.50	4.375– 4.50
KEROSINE		
41-43 w.w.	5.25 – 5.375	5.25 – 5.375
For Export Shipment:		
GASOLINE		
U. S. Motor	5.25 – 5.375	5.50
60-62, 400 e.p.	5.375	5.50
61-63, 390 e.p.	5.375	5.625
64-66, 375 e.p.	5.50	5.625– 5.75

*Nominal.

Prices Effective	Nov. 29	Nov. 22
KEROSINE		
44 w.w.	*5.625	*5.625
41-43 w.w.	5.25 – 5.375	5.25 – 5.375
41-43 p.w.	5.125– 5.25	5.125– 5.25
GAS AND BUNKER OILS		
For Domestic and/or Export Shipment		
‡26-30 translucent gas oil	4.375– 4.50	4.375– 4.50
‡30 plus translucent gas oil	4.50 – 4.625	4.50 – 4.625
‡30 plus transparent gas oil	4.50 – 4.625	4.50 – 4.625
Diesel Oil Ship's bkrs.	†$1.90	†$1.90
Grade C bunker oil, for ship's bunkers	†$0.95	†$0.95
Grade C bunker oil, in cargoes	$0.85	$0.85

‡Less than ½ of 1% sulphur. †Barging 5c bbl additional at some Gulf ports.
*Correction: This price correct for Nov. 1.

MEXICAN CRUDE AND BUNKER OILS
(F.o.b. Steamer, Tampico)

Heavy Panuco crude, taxes to be paid	*$0.96	*$0.96
Grade C bunker oil, ship's bunkers, taxes paid	$1.00	$1.00

MID-CONTINENT LUBRICATING OILS

(Prices in cents per gal. in bbls. f.a.s. Gulf oil terminals. In drums and new barrels, 0.5c to 1c higher per gal. in some instances.)

190-200 vis. D 210 brt. stock	25.50	25.50
150-160 vis. D 210 brt. stock:		
0-10 p.p.	22.50	22.50
10-25 p.p.	21.50	21.50
25-40 p.p.	21.50	21.50
150-160 vis. E 210 brt. stock	21.50	21.50
120 vis. D 210 brt. stock	20.50	20.50
180 vis., No. 3 color neutral:		
0-10 p.p.	16.50	16.50
15-3 p.p.	16.00	16.00
200 vis. No. 3 color neutral:		
0-10 p.p.	17.00	17.00
15-30 p.p.	16.50	16.50
600 s.r. olive green	12.50	12.50
600 s.r. dark green	10.50	10.50
631 s.r.	20.50	20.50

SOUTH TEXAS LUBRICATING OILS

(Via. at 100° F., pour point 0. Tanker, f.o.b. Gulf oil terminals, for export shipment.)

Unfiltered Pale Oils: Via. Color		
100 No. 3	5.50 – 5.75	5.50 – 5.75
200 No. 3	7.25 – 7.50	7.25 – 7.50
300 No. 3	7.75 – 8.00	7.75 – 8.00
500 No. 3½	8.75 – 9.00	8.75 – 9.00
750 No. 4	9.25 – 9.50	9.25 – 9.50
1200 No. 4	9.75 –10.00	9.75 –10.00
2000 No. 4	10.25 –10.50	10.25 –10.50
Red Oils: Via. Color		
100 No. 5-6	5.50 – 5.75	5.50 – 5.75
200 No. 5-6	7.25 – 7.50	7.25 – 7.50
300 No. 5-6	7.75 – 8.00	7.75 – 8.00
500 No. 5-6	8.75 – 9.00	8.75 – 9.00
750 No. 5-6	9.25 – 9.50	9.25 – 9.50
1200 No. 5-6	9.75 –10.00	9.75 –10.00
2000 No. 5-6	10.25 –10.50	10.25 –10.50

Note: Red oil prices shown above cover oils with green cast; prices for blue cast red oils are slightly lower in some cases.

Tanker Rates

(Approximate tanker freight rates to Continental ports, in shillings per ton of 2240 lbs., British sterling; to U. S. ports in cents per bbl.)

Rates Effective Nov. 29

	Crude &/or Fuel		Refined Oil &/or Spirits	
	Last Paid	Owners Ask	Last Paid	Owners Ask
Gulf-U.K./Cont.‡	18/	19/-21/6	29/6	30/-32/
Aruba-U.K./Cont.‡	16/6	17/6-18/	26/6	27/6-28/6
Gulf-N. Atlantic** (not E. of N. Y.):				
Hvy. Crude & Fuel, (10 to 19.9 gravity)	*.265c	27c	....	....
Light Crude, (30 Grav. or Lighter)	*24c	24c	....	....
Gasoline	....	....	*30c	*30c-31c
Kerosine	....	....	*31c	*31c-32c
Light Fuel	....	....	*32c	*32c-33c

Note: Dirty boat quotations are enlarged to cover, "Fuel and Light Crude" quotations.
‡Continental ports in range between Bordeaux and Hamburg, both inclusive.
**Venezuela loading same rate; Tampico 2c to 3c per bbl. additional.

CRUDE OIL MARKETS

Prices in $ per bbl. of 42 U. S. gals at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates as given

EASTERN FIELDS

Posted by Joseph Seep Purchasing Agency

(Effective Oct. 12, 1937, except Corning Sept. 2, 1937)

Penna Grade Oil in Southwest Penna. Pipe Lines.....$2.05
Penna. Grade Oil in Eureka Pipe Lines (West Virginia).....$2.00
Penna. Grade Oil in Buckeye Pipe Lines (Mackaburg, O.).....$1.85
Corning Oil in Buckeye Pipe Lines (Ohio)...$1.27

Posted by Other Companies

Tide Water Pipe Co., Ltd. Bradford-Allegany district (Penna. and N. Y.) (Effective Oct. 12, 1937).....$2.35
The Pennzoil Co.: (Effective Nov. 19, 1937) Penna. Grade Oil in National Transit Lines$2.30
Ashland Oil & Transportation Co.: Somerset Oil in Ashland Lines (Ky.): (Effective Jan. 28, 1937)
Big Sandy River.....$1.42
Kentucky River.....$1.50

*The Pennzoil Co. posts $2.30 in Cochran, Franklin, Hamilton and Doolittle, Pa. fields; prices in other lower districts range down to $2.25 per bbl. at well.

MICHIGAN

Posted by Pure Oil Co.

Midland, Midland County (July 23, 1937)...$1.27

Posted by Simrall Pipe Line Corp.

(Effective July 22, 1937)
West Branch, Arenac, and equal grades.....$1.09
(Effective July 23, 1937)
Beaverton, Crystal, Greendale, Porter and equal grades.....$1.27
Buckeye.....$1.245
(Effective July 1, 1937)
Billings and Tobacco.....$1.395

CENTRAL STATES FIELDS

Posted by Ohio Oil Co.

(Effective Jan. 28, 1937)

Illinois, Princeton.....$1.35
Lima.....$1.25
Owensboro (Western Ky.).....$1.40

Posted by Stoll Oil Refining Co.

(Effective Feb. 1, 1937)

Stoll Pipe Line Oil (Ky.).....$1.40

CANADIAN FIELDS

Posted by Imperial Oil Limited

Western Ontario

(Effective Sept. 9, 1933)

Petrolia.....$2.10
Oil Springs.....$2.17

Alberta—Turner Valley

(Prices f.o.b. field tankage)

(Effective Sept. 1, 1937)

Clear Naphtha, 65 grav. & above.....$2.36

Crude Oil & Discolored Naphtha

40-40.9°	$1.36	53-53.9	$1.62
41-41.9	1.38	54-54.9	1.64
42-42.9	1.40	55-55.9	1.66
43-43.9	1.42	56-56.9	1.68
44-44.9	1.44	57-57.9	1.70
45-45.9	1.46	58-58.9	1.72
46-46.9	1.48	59-59.9	1.74
47-47.9	1.50	60-60.9	1.76
48-48.9	1.52	61-61.9	1.78
49-49.9	1.54	62-62.9	1.80
50-50.9	1.56	63-63.9	1.82
51-51.9	1.58	64-64.9	1.84
52-52.9	1.60	65° & higher, for discolored naphtha only	2.36

Note: Clear naphtha: 22 color; 10 lbs. vapor pressure, Reid method; 90% recovery; end point, 410°. Discolored naphtha: same specifications as for clear naphtha except color.

MID-CONTINENT

Posted by Stanolind Crude Oil Purchasing Co., Jan. 28, 1937

	(In Oklahoma-Kansas)*	(In North-North Central Texas)
Below 29	$1.06	$0.96
29-29.9	1.08	0.98
30-30.9	1.10	1.00
31-31.9	1.12	1.02
32-32.9	1.14	1.04
33-33.9	1.16	1.06
34-34.9	1.18	1.08
35-35.9	1.20	1.10
36-36.9	1.22	1.12
37-37.9	1.24	1.14
38-38.9	1.26	1.16
39-39.9	1.28	1.18
40 & above	1.30	1.20

Above Stanolind prices met as follows:

Jan. 28, Continental Oil Co. met in Okla., Kans., and North Texas. Sinclair-Prairie met in North Texas and North Central Texas, Jan. 28, Stanolind's North Texas schedule. Same date, The Texas Co. met in North-North Central Texas.

Note: Stanolind prices in Okla.-Kans. are for quantities computed by 97% tank tables. In Texas, 100% tank tables are used effective Oct. 1, 1937, volume corrected to 60° F., and deduction for full b.s. & w. content.

*Effective Aug. 1, 1937, for Otis-Albert pools Rush-Barton counties, Kans., 13c less.

Posted by Carter Oil Co.

In Oklahoma

(Effective Jan. 28, 1937)

Below 25	$0.98	33-33.9	$1.16
25-25.9	1.00	34-34.9	1.18
26-26.9	1.02	35-35.9	1.20
27-27.9	1.04	36-36.9	1.22
28-28.9	1.06	37-37.9	1.24
29-29.9	1.08	38-38.9	1.26
30-30.9	1.10	39-39.9	1.28
31-31.9	1.12	40 and above	1.30
32-32.9	1.14		

Above Carter schedule met Jan. 28 by the following companies: Sinclair-Prairie, Shell and Barnsdall in Oklahoma-Kansas; Skelly Oil in Kansas; Tide Water in Oklahoma; Pure Oil in Oklahoma-Kansas, beginning with below 24 at $0.98 and ending with 40 & above at $1.30.

Posted by Magnolia Petroleum Co.

(Effective Jan. 28, 1937)

In Oklahoma, same schedule as Carter Oil, which see above, beginning with below 25, at $0.98 and ending with 40 & above, at $1.30.

In Texas: North and North Central, including Burkburnett, Archer, Henrietta, Electra, Comanche and Olden, same gravity and price schedule as Stanolind in North Texas, which see under Stanolind, beginning with below 29 at $0.96 and ending with 40 and above, at $1.20.

Beaumont, Tex.

(Effective Oct. 1, 1937)

Below 21°	$0.95	27-27.9	$1.15
21-21.9	0.98	28-28.9	1.17
22-22.9	1.01	29-29.9	1.19
23-23.9	1.04	30-30.9	1.21
24-24.9	1.07	31-31.9	1.23
25-25.9	1.10	32-32.9	1.25
26-26.9	1.13	33-33.9	1.27
		34 & above	1.29

TEXAS FIELDS

Posted by Humble Oil & Refining Co.

(*West Central Texas)

(Effective Jan. 28, 1937)

Below 29	$0.96	35-35.9	$1.10
29-29.9	0.98	36-36.9	1.12
30-30.9	1.00	37-37.9	1.14
31-31.9	1.02	38-38.9	1.16
32-32.9	1.04	39-39.9	1.18
33-33.9	1.06	40 and above	1.20
34-34.9	1.08		

*Includes Brown, Callahan, Coleman, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, Throckmorton and Young counties.

Shell Petroleum Corp., effective Jan. 28, posts Humble's above schedule on Fisher county crude, plus these five lower grades, beginning with below 25 gravity at $0.88; 25-25.9, $0.90; 26-26.9, $0.92; 27-27.9, $0.94, and 28-28.9, $0.96; rest of schedule same as Humble's in West Central Texas.

Note: Effective Oct. 1, 1937, Humble prices are based on 100% tank tables at 60F.

*East Central Texas

(Effective Jan. 28, 1937)

Below 29	$1.03	35-35.9	$1.17
29-29.9	1.05	36-36.9	1.19
30-30.9	1.07	37-37.9	1.21
31-31.9	1.09	38-38.9	1.23
32-32.9	1.11	39-39.9	1.25
33-33.9	1.13	40 and above	1.27
34-34.9	1.15		

*Including Anderson, Cherokee, Limestone, Navarro counties.

Same date, Sinclair-Prairie met in Mexia Humble's above schedule.

PANHANDLE TEXAS

Posted by Humble Oil & Refining Co.

(Effective Jan. 28, 1937)

	Gray County	Carson-Hutchinson
Below 35	$0.96	$0.91
35-35.9	0.98	0.93
36-36.9	1.00	0.95
37-37.9	1.02	0.97
38-38.9	1.04	0.99
39-39.9	1.06	1.01
40 & above	1.08	1.03

Jan. 28, above prices met by Sinclair-Prairie and Magnolia in the entire area and by Continental in Carson-Hutchinson and by Texas Co. in Panhandle Sweet, same as Humble's Gray Co. and on Panhandle Sour, same as Carson-Hutchinson.

EAST TEXAS

(Effective May 22, 1937)

Stanolind, Humble, Shell, Sinclair-Prairie, Texas Co., and Magnolia.....$1.35

Shell also posted on Jan. 28, in Livingston area, Polk County, Texas, $1.27.

NORTHEAST TEXAS

(Posted by Humble, Jan. 28, 1937)

Talco.....$0.73

(Posted by Magnolia, Jan. 28, 1937)

Cass County and Panola County, Tex: Same gravity and price schedule as S. O. Louisiana posts for Rodessa, La., which see under that company.

(Posted by The Texas Co., Jan. 28, 1937)

Cass County.....$1.25

WEST TEXAS AND NEW MEXICO

Posted by Humble Oil & Refining Co.

(Effective Jan. 28, 1937)

(Including Andrews, Crane, Crockett, Ector, Glasscock, Howard, Winkler and Upton Counties, Texas and Lea county, New Mexico).

Below 26	$0.78	33-33.9	$0.94
26-26.9	0.80	34-34.9	0.96
27-27.9	0.82	35-35.9	0.98
28-28.9	0.84	36-36.9	1.00
29-29.9	0.86	37-37.9	1.02
30-30.9	0.88	38-38.9	1.04
31-31.9	0.90	39-39.9	1.06
32-32.9	0.92	40 & above	1.08

Pecos, West Texas.....$0.91

Jan. 28, Magnolia met Humble in Crane, Upton, Howard, Glasscock, Mitchell and Winker.

Shell Petroleum Corp., on Jan. 28, met Humble in Crane, Glasscock, Howard, Pecos (except Yates shallow pool), Winkler, and Upton counties, Tex., and in Lea County, N. Mex. On Jan. 28, Shell posted in Yates shallow pool in Pecos county, Tex., $0.81. June 4, 1937, Shell added Ector county to West Texas postings.

Jan. 28, Stanolind Oil & Gas Co. met Humble in Hendrick field, Winkler county.

Jan. 28, Texas Co. met Humble in Ward and Winkler counties, Tex., and Lea County, N. M.

April 20, 1937, Sinclair Prairie met Humble in Ward and Winkler, Tex. and Lea, N. M., counties, except that its gravity schedule ends with 36 and above, at $1.00.

Posted by Continental Oil Co.

(Effective Jan. 28, 1937)

Artesia, Jackson and Maljamar pools, N. M. $0.90

COLORADO

(Posted by Continental Oil Co., Effective Jan. 28, 1937)

Ft. Collins and Wellington

Below 29	$1.01	35-35.9	$1.15
29-29.9	1.03	36-36.9	1.17
30-30.9	1.05	37-37.9	1.19
31-31.9	1.07	38-38.9	1.21
32-32.9	1.09	39-39.9	1.23
33-33.9	1.11	40 & above	1.25
34-34.9	1.13		

Cannon City and Florence, Col.....$1.10

SOUTH AND SOUTHWEST TEXAS

Posted by Humble Oil & Refining Co.

(Effective Jan. 28, 1937)

Carroll, Clark, Darst Creek, Hilbig, Salt Flat and Zoboroski fields.....$1.09
Pettus.....$1.37 Van Zandt.....$1.10

(Effective Nov. 1, 1936)

Heyser heavy...$0.90 Placedo heavy..$0.90
Heyser light..... 1.15 Taft..... 0.95

Shell Pet. Corp. on Jan. 28, posted $1.09 in Salt Flat district, Tex.

Anahuac, Dickinson, Flour Bluff and Turtlebay

(Effective Jan. 28, 1937)

Below 31	$1.16	36-36.9	$1.28
31-31.9	1.18	37-37.9	1.30
32-32.9	1.20	38-38.9	1.32
33-33.9	1.22	39-39.9	1.34
34-34.9	1.24	40 and above	1.36
35-35.9	1.26		

Jan. 28, Magnolia met Humble in Darst Creek; posted $1.00 in Luling; $1.12 in Lytton Springs; $1.27 for Cleveland, Liberty county, Tex.; $1.15 in Hardin, Liberty county, Tex.

Jan. 28, 1937, The Texas Co. met Humble in Darst Creek.

Posted by Humble

Conroe, Raccoon Bend, Tomball and Satsuma
(Deep sand crudes)
(Effective Jan. 28, 1937)

Below 29	$1.20	35-35.9	$1.34
29-29.9	1.22	36-36.9	1.36
30-30.9	1.24	37-37.9	1.38
31-31.9	1.26	38-38.9	1.40
32-32.9	1.28	39-39.9	1.42
33-33.9	1.30	40 & above	1.44
34-34.9	1.32		

Jan. 28, Magnolia met Humble in Tomball and Texas Co. met Humble in Conroe, beginning with 35-35.9 gravity.

Posted by Humble

Mirando, Heavy and Light
(Effective July 6, 1937)

Below 21	$0.96	31-31.9	$1.18
21-21.9	0.98	32-32.9	1.20
22-22.9	1.00	33-33.9	1.22
23-23.9	1.02	34-34.9	1.24
24-24.9	1.04	35-35.9	1.26
25-25.9	1.06	36-36.9	1.28
26-26.9	1.08	37-37.9	1.30
27-27.9	1.10	38-38.9	1.32
28-28.9	1.12	39-39.9	1.34
29-29.9	1.14	40 & above	1.36
30-30.9	1.16		

July 6, Magnolia posted same schedule as Humble in Mirando.

July 6, 1937, Texas Co. posted for Duval-Mirando, $0.96 for below 21, plus 2c differential, to $1.12 for 28 & above.

(Continued on next page)

CRUDE OIL MARKETS

(Continued from preceding page)

NORTH LOUISIANA-ARKANSAS

Posted by Standard Oil Co. of Louisiana

(Effective Jan. 28, 1937)

(In Caddo, Homer, Haynesville, Sabine, De Soto, Sarepta, Carterville, El Dorado, Bunkie, and Miller county).

Below 25	**$0.90**	33-33.9	$1.08
25-25.9	**0.92**	34-34.9	1.10
26-26.9	**0.94**	35-35.9	1.12
27-27.9	**0.96**	36-36.9	1.14
28-28.9	**0.98**	37-37.9	1.16
29-29.9	**1.00**	38-38.9	1.18
30-30.9	**1.02**	39-39.9	1.20
31-31.9	**1.04**	40 and above	1.22
32-32.9	**1.06**		

Rodessa, La.

(Effective Jan. 28, 1937)

Below 25	$0.93	33-33.9	$1.11
25-25.9	0.95	34-34.9	1.13
26-26.9	0.97	35-35.9	1.15
27-27.9	0.99	36-36.9	1.17
28-28.9	1.01	37-37.9	1.19
29-29.9	1.03	38-38.9	1.21
30-30.9	1.05	39-39.9	1.23
31-31.9	1.07	40 and above	1.25
32-32.9	1.09		

Choctaw and Darrow

Jan 28, 1937, initial posting; same schedule as Humble posts in Mirando, Tex., which see.

Smackover, Ark	$0.90
Urania, La. (La. Oil Refg. Co., Jan. 10, '36)	0.97
Tepetate, La. (Continental Oil. Jan. 28, '37)	1.24

Jan. 28, 1937, Magnolia met S. O. La.'s No. La.-Ark. gravity and price schedule in Pine Island, Haynesville, Bull Bayou and Cotton Valley, La., and in Eldorado and Rainbow districts, Ark.; and met S. O. La.'s Rodessa prices; and in Lockport, Iowa, Cameron Meadow, La., posted Humble's gravity and price schedule on Mirando.

Jan. 28, The Texas Co. met S. O. La. in N. La., except that its gravity schedule begins with below 27 at $0.94. It posted $1.37 for Garden Island, La., $1.24 for LaFitte, La. and $0.90 for Smackover

*GULF COASTAL FIELDS

Posted by Humble Oil & Refining Co and The Texas Co.

	(Effective Jan. 28, 1937) Humble	Texas	Saxet (Humble) (July 6 '37)
Below 18	$0.95	$0.90	....
18-18.9	for	0.92	....
19-19.9	below	0.94	....
20-20.9	21°	0.96	$1.01
21-21.9	0.98	0.98	1.03
22-22.9	1.01	1.01	1.05
23-23.9	1.04	1.04	1.07
24-24.9	1.07	1.07	1.09
25-25.9	1.10	1.10	1.11
26-26.9	1.13	1.13	1.13
27-27.9	1.15	1.15	1.15
28-28.9	1.17	1.17	1.17
29-29.9	1.19	1.19	1.19
30-30.9	1.21	1.21	1.21
31-31.9	1.23	1.23	1.23
32-32.9	1.25	1.25	1.25
33-33.9	1.27	1.27	1.27
34-34.9	1.29	1.29	1.29
35-35.9	1.31	for	1.31
36-36.9	1.33	oil	1.33
37-37.9	1.35	34°	1.35
38-38.9	1.37	and	1.37
39-39.9	1.39	above	1.39
40 and above	1.41	....	1.41

Effective Dec. 1, 1934, Humble prices are based on 99% tank tables at 60F. Allowance or deduction of 1% is made for each 25° change in temperature above or below 60F

*Humble's prices apply in these fields: Barbers Hill, Goose Creek, Hull, Humble, Liberty, Moss Bluff, Mykawa, Orange, Pierce Junction, Plymouth, Rabbs Ridge, Raccoon Bend (shallow sand), Refugio light and †heavy, Sour Lake, Spindletop, Sugarland and West Columbia. †Except these grades of Refugio heavy: effective July 6, 1937: Below 20, $0.95; 20-20.9, $1.01; 21-21.9, $1.03; 22-22.9, $1.05; 23-23.9, $1.07; 24-24.9, $1.09; and 25-25.9, $1.11; rest of schedule same as other Gulf Coastal crude.

Jan. 28, Sinclair-Prairie met above Humble schedule in full.

July 6, 1937, The Texas Co. posted for Refugio, which includes Greta, Saxet and Taft: $1.01 for below 21, plus 2c differential, to $1.17 for 28 & above.

Texas Co. postings in Gulf Coastal Texas include: Arriola, Five Corners, Ganado, Humble, Liberty, Magnet, Manvel, Markham, Mauritz, Pickett Ridge, Port Neches, Sour Lake, West Columbia and Withers. In Gulf Coastal Louisiana: Bay St. Elaine, Caillou Island, Dog Lake, Four Isle, Gillis, Horseshoe Bayou, Iberia, Lake Barre, Lake Pelto, Leesville and Port Barre.

ROCKY MOUNTAIN FIELDS

Posted by Stanolind Oil & Gas Co.

(Effective Jan. 28, 1937)

Salt Creek, Midway and Dutton Creek, Wyo., same schedule as Stanolind posts in Oklahoma, Kansas which see under Mid-Continent crude on previous page.

Greybull-Torchlight	$1.30
Iles, light, Col	1.18
Iles, heavy	1.12
Hogback, N. M.	1.33
Big Muddy	1.23
Elk Basin, light	1.30
Grass Creek, light	1.30
Frannie light	0.82

(Effective Nov. 4, 1936)

Grass Creek, heavy	$0.62
Frannie heavy	0.62
Hamilton Dome, Wyo	0.57

Pondera, Mont., (Postings discontinued July 1, 1936, but Stanolind pays price posted by Ohio Oil for Kevin-Sunburst, less 20c per bbl.)

Posted by Ohio Oil Co

(Effective Jan. 28, 1937)

Elk Basin, Wyo	$1.30
Grass Creek, light	1.30
Rock Creek	1.205
Lance Creek	0.97
Sunburst, Mont	1.20

Posted by *International Refg. Co.

Cut Bank, Mont.

(Effective Jan. 28, 1937)

Below 35°	$1.34	38-38.9	$1.42
35-35.9	1.36	39-39.9	1.44
36-36.9	1.38	40 and above	1.46
37-37.9	1.40		

*Texas Co. subsidiary.

Posted by Continental Oil Co.

(Effective Jan. 28, 1937)

Cat Creek, Mont	$1.40
Big Muddy, Wyo	1.18
Lance Creek, Wyo	0.97

CALIFORNIA, *Posted by Standard Oil of California*

All gravities above those quoted take highest price offered in the field. Prices effective Feb. 26, 1936, except Huntington Beach, Playa del Rey, Santa Fe Springs, Kern Front, Signal Hill (Long Beach) effective March 7, 1936; Elk Hills effective June 22, 1936; Lakeview Area, Aug. 19, 1936; El Segundo and Wilmington, Oct. 15, 1937

Gravity	Signal Hill (Long Beach) El Segundo †Wilmington	Seal Beach	Alamitos Heights	Huntington Beach	Inglewood	Playa del Rey	Olinda Brea Canon	Athens Rosecrans	Dominguez	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	‡Newhall and others	Mountain View	Elk Hills	Buena Vista Hills **Midway-Sunset	Lakeview Area	Lost Hills	Coalinga	Wheeler Ridge
14-14.9	$0.80	0.79	0.74	0.78	0.79	0.80	0.76	....	....	0.80	0.76	0.76	0.77	0.78	....	0.70	....	0.70	0.70	0.70	0.70	0.70	....
15-15.9	.80	.79	.74	.78	.79	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	....	.70	.70	.70	.70	.70	....
16-16.9	.80	.79	.74	.78	.79	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	....	.70	.70	.70	.70	.70	....
17-17.9	.80	.79	.74	.78	.81	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	....	.70	.70	.70	.70	.70	....
18-18.9	.80	.79	.74	.78	.84	.80	.78	....	....	.82	.76	.76	.77	.78	....	.70	....	.70	.70	.70	.70	.70	....
19-19.9	.82	.79	.74	.82	.87	.84	.81	....	....	.85	.76	.78	.77	.78	....	.70	.78	.74	.74	.74	.74	.71	.70
20-20.9	.85	.79	.74	.85	.90	.88	.84	....	....	.88	.78	.82	.77	.80	....	....	.78	.78	.78	.78	.78	.72	.70
21-21.9	.88	.79	.74	.89	.93	.93	.88	....	....	.91	.80	.85	.77	.84	.78	....	.78	.82	.82	.82	.82	.74	.70
22-22.9	.92	.82	.74	.92	.96	.98	.92	....	....	.93	.84	.89	.79	.88	.78	....	.77	.87	.87	.87	.86	.78	.73
23-23.9	.95	.86	.77	.96	.99	1.02	.96	.84	.79	.96	.88	.93	.82	.92	.78	....	.80	.92	.92	.92	.90	.82	.76
24-24.9	.99	.91	.80	1.00	1.02	1.06	.99	.88	.81	.99	.91	.96	.85	.96	.82	....	.84	.97	.97	.97	.94	.86	.79
25-25.9	1.03	.95	.82	1.03	1.05	1.11	1.03	.93	.83	1.02	.95	....	.89	.99	.86	....	.88	1.01	1.01	1.01	.98	.90	.83
26-26.9	1.06	1.00	.85	1.07	1.09	1.16	1.06	.98	.86	1.05	.98	....	.92	1.03	.90	....	.91	1.06	1.06	1.06	1.02	....	....
27-27.9	1.10	1.05	.88	1.11	1.12	....	1.10	1.03	.88	....	1.02	....	.96	1.06	.95	....	.95	1.10	1.10	1.10	1.06	....	....
28-28.9	1.14	1.10	.90	1.14	1.15	....	1.14	1.07	.90	....	1.06	....	.99	1.10	.99	....	.99	1.15	1.15	1.15	1.10	....	....
29-29.9	1.17	1.15	.93	1.18	1.18	....	1.17	1.12	.93	....	1.09	....	1.03	1.14	1.03	....	1.02	1.20	1.20	1.20	1.14	....	....
30-30.9	1.21	1.19	.95	1.22	1.21	....	1.21	1.17	.95	....	....	....	1.07	1.17	1.08	....	1.06	1.25	1.25	1.25	1.18	....	....
31-31.9				....	1.24	....	1.24	1.22	.97	....	....	....	1.11	1.21	1.12	....	1.09	1.29	1.29	1.29			
32-32.9	*Elwood Terrace			....	1.27	....	1.27	1.27	1.00	....	....	....	1.14	1.25	1.16	....	1.13	1.34	1.34	1.34	Kettleman Hills		
33-33.9	....	1.28	....	....	....	....	....	1.32	....	....	....	....	1.18	1.28	1.20	....	1.17	1.38	1.38	1.38	....	1.19	....
34-34.9	....	1.32	....	....	....	....	....	1.37	....	....	....	....	1.22	1.32	1.25	....	1.20	....	....	....	....	1.23	....
35-35.9	....	1.35	....	....	....	....	....	1.42	....	....	....	....	1.25	....	1.29	....	....	....	....	....	....	1.27	....
36-36.9	....	1.39	....	....	....	....	....	1.46	....	....	....	....	1.29	....	1.33	....	....	....	....	....	....	1.31	....
37-37.9	....	1.43	....	....	....	....	....	1.51	....	....	....	....	1.32	....	1.37	....	....	....	....	....	....	1.35	....
38-38.9	....	....	....	....	....	....	....	1.56	....	....	....	....	1.36	....	1.42	....	....	....	....	....	....	1.39	....
39-39.9	....	....	....	....	....	....	....	1.61	....	....	....	....	1.40	....	....	....	....	....	....	....	....	1.43	....
40-40.9	....	....	....	....	....	....	....	1.66	....	....	....	....	1.43	....	....	....	....	....	....	....	....	....	....

Standard Pipe Line

*F. o. b. ship.

‡Also McKittrick, Kern River, Kern Front and Round Mountain $0.70 thru 19.9 gravity; no higher gravity quoted. **Except Lakeview Area. †Wilmington prices differ on gravities below 18.9. Prices are: 14-16.9, $0.75; 17-17.9, $0.77; and 18-18.9, $0.79; rest of schedule same as Signal Hill.

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Coming Meetings

National Asphalt Conference, Memphis, Tenn., week of Dec. 6.
American Society of Mechanical Engineers, New York, Dec. 6 to 10.
Automotive Service Industries Show, Navy Pier, Chicago, Ill., Dec. 6 to 11.
Virginia Oil Jobbers Assn., John Marshall Hotel Richmond, Dec. 10.
Exposition of Chemical Industries, Grand Central Palace, New York, N. Y., Dec. 6 to 11.
Nebraska Petroleum Marketers, Inc., Fontenelle Hotel, Omaha, Nebr., Dec. 7, 8 and 9.
Society of Automotive Engineers, National Production Meeting, Hotel Durant, Flint, Mich., Dec. 8, 9 and 10.
American Chemical Society, Division Organic Chemistry, Richmond, Va., Dec. 28, 29 and 30.

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Independent Oil Jobbers Assn. of Okla., Oklahoma City, Okla., Jan. 13.
Northwest Petroleum Assn., North Dakota Division, Minot, N. D., Jan. 24 and 25.
Northwest Petroleum Assn., Minnesota Division, Hotel Radisson, Minneapolis, Jan. 27 and 28.
Kentucky Petroleum Marketers Assn., Brown Hotel, Louisville, Ky., Feb. 7, 8 and 9.
Kansas Oil Men's Assn., 24th annual convention and oil exposition, Hotel Broadview, Wichita, Kans., Feb. 14 and 15.
American Institute of Mining and Metallurgical Engineers, annual meeting, Engineering Societies Bldg., New York, N. Y., Feb. 14 to 18.
Ohio Petroleum Marketers Assn., fifteenth annual meeting, Hotel Deshler-Wallick, Columbus, Ohio, Feb. 22, 23 and 24.
Wisconsin Petroleum Assn., Schroeder Hotel, Milwaukee, Wis., Feb. 22, 23 and 24.
Indiana Independent Petroleum Assn., Spring Convention and Refiners and Suppliers Exhibit, Hotel Severin, Indianapolis, Ind., March 2, 3 and 4.
American Society for Testing Materials, Spring Regional Meeting and Group Committee Meetings, Seneca Hotel, Rochester, N. Y., March 7 to 12.
American Assn. of Petroleum Geologists, 23rd annual meeting, Roosevelt Hotel, New Orleans, La., March 16 to 18.
American Petroleum Institute, division of production, spring meeting, southwestern district, Blackstone Hotel, Fort Worth, Texas, March 24 and 25.
National Petroleum Assn., Cleveland, Ohio, April 13 to 15.